NERL/HEASD Publications

Jan 1, 1999 - Dec 31, 1999   *Presented Published*

ABSTRCT/ORAL

Edney, E.O., Swartz, E.C., Driscoll, D.J., Kleindienst, T.E., Li, W., Conver, T.S., and McIver, C.D. EPA PM chemistry studies: smog chamber studies of secondary organic aerosols from irradiated hydrocarbons under ambient conditions. Presented at: American Geophysical Union Fall Meeting 1999, San Francisco, CA, December 11-17, 1999.   12/11/1999

Contact: Daniel J. Driscoll

Abstract:

Edney, E.O., Swartz, E.C., Driscoll, D.J., Speer, R.E., Kleindienst, T.E., Li, W., McIver, C.D., and Conver, T.S. EPA PM chemistry studies. Presented at: US/German Ozone/Fine Particle Science and Environmental Chamber Workshop, Riverside, CA, October 4-7, 1999.   10/4/1999

Contact: Edward O. Edney

Abstract:

Luecken, D.J., and Kleindienst, T.E. EPA gas phase chemistry chamber studies. Presented at: US/German Ozone/Fine Particulate Science and Environmental Chamber Workshop, Riverside, CA, October 4-7, 1999.   10/4/1999

Contact: Deborah J. Luecken

Abstract: Gas-phase smog chamber experiments are being performed at EPA in order to evaluate a number of current chemical mechanisms for inclusion in EPA regulatory and research models. The smog chambers are 9000 L in volume and constructed of 2-mil teflon film. One of the chambers is constructed so that it can be rolled outside to conduct experiments in natural sunlight. The chambers are irradiated by a system of 122 cm fluorescent bulbs, designed to match, to the extent possible, the distribution of solar radiation between 300 and 400 rim. Previous experiments have concentrated on single compounds, while current experiments focus on complex mixtures of straight-chain and branched hydrocarbons. The experiments have been designed for evaluating and comparing chemical mechanisms, as well as for improving the treatment of uncertain reactions in current mechanisms. Future plans include using enhanced analysis techniques to more completely characterize NOy and product formation.   This work has been funded in part by the United States Environmental Protection Agency under 68D50059 with Man Tech Environmental Technology, Inc. It has been subjected to Agency review and approved for clearance.

Jan 1, 1999 - Dec 31, 1999

Edney, E.O., Swartz, E.C., Driscoll, D.J., Kleindienst, T.E., Li, W., Conver, T.S., and McIver, C.D. Smog chamber studies of secondary organic aerosols from irradiated hydrocarbons under ambient conditions. Presented at: American Geophysical Union Fall Meeting, San Francisco, CA, December 13-17, 1999.

12/13/1999

Contact: Daniel J. Driscoll

Abstract: Understanding the physics and chemistry of aerosols is fundamental to evaluating health risks and developing and evaluating atmospheric models. However, as noted in a recent NRC report only about 10% of the organics in PM2.5 have been identified. A significant portion of the unidentified fraction could be polar compounds formed from the oxidation of aromatic and biogenic hydrocarbons that are taken up by pre-existing aerosols. Secondary organic aerosols (SOA), formed when products of gas-phase reactions partition into the aerosol phase, have been found to represent up to 70% of the organic mass. Thus a comprehensive understanding of the key chemical and physical parameters that control their formation under ambient conditions is required.   Information such as secondary organic aerosol (SOA) yields at near ambient concentrations conditions in the absence and presence of aqueous films, the impact of deposited organics on the hydroscopic properties of the aerosol, and chemical composition of the organic aerosol are needed to develop and evaluate models for tropospheric aerosols. A flow chamber was developed for generating secondary organic and inorganic aerosols by irradiating mixtures of hydrocarbons (HC), oxides of nitrogen (NOx) in air in the presence or absence of preexisting inorganic aerosols in the form of $(NH4)2\ S04$. The chamber was designed so relative humidity could be controlled (20-80% R.H.) and near ambient concentrations could be used. Steady state gas phase concentrations of HC, NOx, 03, PAN, carbonyl compounds, organic acids, and HN03 were measured. The exposed aerosol were analyzed for their size, mass, inorganic composition including liquid water concentrations and total organic carbon contents. Measurements of the SOA yield were made frown organic carbon measurements of 24 hour filter collections and the mass of reacted hydrocarbon. The secondary organic aerosol yield of 1.59% was found for toluene at an organic aerosol concentration of 8.2 ugm-3, 1.09% for p-xylene at 6.4 ugm-3, and 0.41 % for 1,3,5-trimethyl benzene at 2.0 ugm-3. In general, these results agree with those reported by Odum et al. and appear to be consistent with the gas-aerosol partitioning theory developed by Pankow. This work has been funded wholly or in part by the United States Environmental Protection Agency under Contract 68-D5-0049 to ManTech Environmental Technology, Inc.. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommended use.

Seila, R.L., Main, H.H., Arriaga, J.L., Martinez, G., and Ramadan, A.B. 1996 Paso del Norte ozone study VOC measurements. Abstract presented at: 1999 92nd A&WMA National Meeting, St. Louis, MO, June 20-24, 1999.

6/1/1999

Contact: Robert L. Seila

Abstract:

Arriaga, J.L., Ordunez, R., Escalona, S., Martinez, G., Cervantes, A.D., and Seila, R.L. VOCs in Ciudad Juarez urban atmosphere. 1999 A&WMA National Meeting, St. Louis, MO, June, 1999.

6/1/1999

Contact: Robert L. Seila

Abstract:

Jan 1, 1999 - Dec 31, 1999

Solomon, P.A., Mitchell, W.J., Gemmill, D.B., Tolocka, M.P., Wiener, R.W., Eberly, S.I., Rice, J., Homolya, J., and Miguel, A.H. PM 2.5 chemical speciation sampler evaluation field program: results from the four city study. Presented at: American Association for Aerosol Science, Tacoma, WA, October 11-15, 1999.

Contact: Paul A. Solomon

Abstract: The objective of this sampler intercomparison field study is to determine the performance characteristics for the collection of the chemical components of PM2.5 by the chemical speciation monitors developed for the national network relative to each other, to the Federal Reference Method (FRM), and to other historically accepted monitors. While the FRM is the standard for mass, there are no such standards for the chemical components of PM2.5. Thus, this intercomparison will establish which methods are equivalent to each other on a species by species basis. For volatile species (e.g., ammonium nitrate and semi-volatile organic compounds), the FRM provides only a lower limit on the expected mass loading for that species, as there is potential for loss of these species from the inert Teflon filters. For stable species, the FRM should provide an accurate estimate of the mass loading for those species. The historical samplers will provide an additional set of samples for comparison; however, they still can only be compared on an equivalent basis as none represent a reference method sampler.   The chemical speciation monitors have been developed and manufactured by three vendors under the National PM Sampler procurement, the need for which was described under 40 CFR, Part 58, Appendix C. The three samplers are the Reference Ambient Air Sampler (RAAS) developed by Andersen, Mass Aerosol Speciation Sampler (MASS) developed by University Research Glassware (URG), and Spiral Ambient Speciation Sampler (SASS) developed by MetOne. Two FRM samplers were operated at each site and collected aerosol samples on Teflon and quartz-fiber filters to allow for chemical characterization, similar to the chemical speciation monitors. Historically accepted methods include the IMPROVE sampler, the Versatile Air Pollution Sampler, and the South Coast Air Quality Management District's PTEMP sampler. Chemical characterization included, sulfate, nitrate, ammonium, and chloride by ion chromatography, elements by XRF, OC/EC by TOR, and mass by gravimetric analysis. Appropriate filter media were used to allow for chemical analysis by these routine methods. Because of statistical and practical considerations, four locations were chosen: Philadelphia, PA, Phoenix, AZ, Rubidoux, CA, and Research Triangle Park, NC. Statistical analysis of the data involved comparisons among the different samplers to examine differences in the determined chemical components due to sampler design characteristics. The results of this limited four-city intercomparison study will be presented and eventual differences found among the samplers discussed in light of known aerosol collection processes and site characteristics.   This work has been funded wholly or in part by the United States Environmental Protection Agency. Portions of the work were performed under Contract No. 68-D5-0040 by Research Triangle Institute. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Scheffe, R.D., Solomon, P.A., and Pitchford, M. The supersites program. Presented at: American Association for Aerosol Science, Tacoma, WA, October 11-15, 1999.

Contact: Paul A. Solomon

Abstract:

The PM2.5 monitoring program is dominated by gravimetric measurements (over 1000 mass samplers nationwide) specific for indicator mass, where the primary objective is comparisons with the PM2.5 National Ambient Air Quality Standards (NAAQS). The other major component of the network is the speciation program, estimated to deploy as many as 300 samplers nationwide, and dominated largely by filter based technologies. The speciation program is designed to characterize the chemical composition of airsheds across the nation to support the development of State Implementation Plans (SIPs) and for ongoing air quality trends analyses. Modifications to both the mass and speciation components have been made in response to advice from the scientific community encouraging more frequent mass and speciation sampling to assist health effects and exposure research efforts. Regardless of the monitoring objective of concern, there is a general consensus and widespread support for advancing sampling and analysis methods that lead toward more resolved aerosol compositions in time, chemistry, phase, and size with attendant reduction in sampling artifacts. The Supersites program was conceived in recognition of this need to foster testing and eventual application of advanced methods as a complement to the more routine technologies envisioned at this stage of program deployment.   Based on a series of meetings and workshops with a wide spectrum of health and atmospheric scientists, the Supersites program has evolved to incorporate three principal objectives: 1) SIPs ....support development of State Implementation Plans (SIP's) through improved understanding of source-receptor relationships leading to improved design, implementation, and tracking of control strategy effectiveness in the overall PM program;   2) health effects and exposure....development of monitoring data and samples to support health and exposure studies to reduce uncertainty in National Ambient Air Quality Standards setting and to enable improved health risk assessments; and   3) methods testing .... comparison and evaluation of emerging sampling methods with routine techniques to enable a smooth transition to advanced methods.   Over the last decade several major field programs have been conducted by consortiums composed of private sector, government and academic scientists and sponsors. The Supersites program reflects a concerted effort by EPA to actively engage with its industrial and academic partners in major field programs that historically have produced valuable insights in measurement techniques and characterization of atmospheric processes. Moreover, the program seeks to provide a unifying vehicle that not only attempts to link efforts across diverse geographic and airshed domains, but fosters collaboration across health effects, exposure, atmospheric science and regulatory disciplines. These communication benefits across technical and organizational lines are expected to be as important as the direct technical findings emerging from the program.   This paper will provide an overview of the Supersites program, and report on the initial Atlanta, Georgia study conducted in August, 1999.   This work has been funded wholly or in part by the United States Environmental Protection Agency through internal funding. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

10/11/1999

Fuerst, R.G. Environmental technology verification's advanced monitoring systems pilot. 1998 AWMA-ASME-EPA Environmental Informational Exchange, St. Louis, MO, June 20-24, 1999.

Contact: Robert G. Fuerst

Abstract:

6/20/1999

Tolocka, M.P., Chen, F.L., and Wiener, R.W. Comparison of Modified and Reference Inlets for PM10 Samplers. A&WMA 92nd Annual Meeting & Exhibition, St. Louis, MO, June 20-24, 1999.

Contact: Russell W. Wiener

Abstract:

6/20/1999

Berkley, R.E., Gardner, B., Young, W., Oliver, K.D., and Adams, J.R. Use of a fast laboratory version of method TO-14 as reference standard for field comparison studies with on-site instruments. InfoScience On-Site Conference, San Antonio, TX, January 24-27, 1999.

Contact: Richard E. Berkley

Abstract:

1/4/1999

Jan 1, 1999 - Dec 31, 1999

Solomon, P.A., Mitchell, W.J., Gemmill, D.B., Tolocka, M.P., Wiener, R.W., and Homolya, J. PM 2.5 Chemical Speciation Monitor Evaluation Field Program: Preliminary Results. A&WMA 92nd Annual Meeting & Exhibition, St. Louis, MO, June 20-24, 1999.

6/20/1999

Contact: Russell W. Wiener

Abstract:

Kellogg, R., Willis, R.D., and Conner, T.L. Preliminary Assessments of Filter Deposit Uniformity for X-ray Fluorescence Analysis. EPA/AWMA Air Toxics Symposium, Cary, NC, 09/1-3/98.

9/1/1999

Contact: Teri L. Conner

Abstract:

Falconer, R.L., Wiberg, K., Tuttle, M.A., Leone, A.B., Amato, S.J., and Jantunen, L.M. Enantiomeric ratios as source tracers of OC pesticides in Great Lakes air. Presented at: Society of Environmental Toxicology and Chemistry Conference, Philadelphia, PA, November 14-19, 1999.

11/14/1999

Contact: Renee L. Falconer

Abstract:

Pleil, J.D., Prah, J.D., Ashley, D., Case, M.W., and Colon, M. Controlled methyl tertiary butyl ether (MTBE) exposure to humans through dermal, ingestion, and inhalation routes and the resultant biomarker tertiary butyl alcohol (TBA) as measured in exhaled breath and venous blood. Presented at: EPA/NIEHS In-House Workshop on Applying Biomarker Research, Chapel Hill, NC, August 30-31, 1999.

8/30/1999

Contact: Joachim D. Pleil

Abstract: Radiocarbon (14C) measurements provide an estimate of the fraction of carbon in a sample that is biogenic. In September 1997 during SCOS97 a series of 3-h canister samples of ambient air were collected at the Azusa air monitoring station during morning and afternoon periods. The fraction of VOC that was biogenic ranged from 0 to 38% for the 10 samples on which 14C measurements were performed, with a mean value of 15 %. GC-FID measurements were also performed on the same samples. The presentation will give details of the results along with a description of the technology involved in the sampling, sample preparation, and 14C analysis (by accelerator mass spectrometry). In addition an example of how similar measurements performed in Atlanta were related to emissions inventories will be given.   This work has been funded wholly or in part by the United States Environmental Protection Agency under Interagency Agreement No. 13937923 to the National Institute of Standards and Technology, and Contract No. 68-D5-0049 to ManTech Environmental Technology, Inc. It has been subjected to Agency review and approved for publication.

Falconer, R.L., Wiberg, K., Tuttle, M.A., Leone, A.B., Amato, S.J., and Jantunen, L.M. Enantiomeric ratios as source tracers of OC pesticides in Great Lakes air. Presented at: Society of Environmental Toxicology and Chemistry Conference, Philadelphia, PA, November 14-18, 1999.

11/14/1999

Contact: Renee L. Falconer

Abstract: Organochlorine (OC) pesticides were used heavily in the cornbelt regions during the 60's and 70's. Volatilization of these pesticides from agricultural soils may be a significant source of contaminants to the atmosphere which may later be deposited in the Great Lakes. Pesticides are lost from soils by physical processes (volatilization, leaching), chemical breakdown and microbial attack. The latter is the only known mechanism that can result in enantioselective degradation. Enantioselective breakdown in soils may give an "old" source signature which can be used to track releases to the atmosphere and inputs to the Great Lakes. This work was done to determine if enantioselective degradation and subsequent volatilization of non-racemic pesticide residues from soils occurs and can be used to distinguish sources. Laboratory degradation studies were conducted by spiking racemic OC pesticides into pre-screened soils and determining enantiomeric ratios (ERs) over time. Field volatilization studies found that non-racemic pesticide ERs are conserved in the air above the soil upon volatilization. ERs of the OC pesticide Chlordane in home air were found to be very close to racemic while ambient air ERs were nonracemic. Multivariate Analysis was done to classify groups and determine trends and patterns. This work shows the possibilities of using enantiomers of chiral pesticides to follow degradation and exchange processes around and in the Great Lakes.   The research described herein was developed by the author, an employee of the US. Environmental Protection Agency, on her own. time. It was conducted independently of EPA employment and has not been subjected to the Agency's peer and administrative review. Therefore, the conclusions and opinions drawn are solely those of the author and should not be construed to reflect the views of the Agency.

Varns, J., Mulik, J.D., Sather, M.E., Lister, M., Glenn, G., Smith, L., Williams, D.D., Betz, E.A., and Hines, A.P. The passive ozone network in Dallas (POND concept) - a modeling opportunity with community involvement. Presented at: Annual Air Pollution Workshop, Corvallis, OR, April 26-29, 1999.

4/26/1999

Contact: Jerry L. Varns

Abstract: Despite tremendous efforts towards regulating and controlling tropospheric ozone (O3) formation, over 70 million people currently live in U.S. counties which exceed the National Ambient Air Quality Standard (NAAQS) set for 03. These high 03 concentrations alone cost the U.S. approximately $5 billion annually in reduced crop yields and excessive human health costs. The attention upon urban 03 abatement, a focus of the 1990 Clean Air Act Amendments, does not encompass the broad scale management for this pollutant -03 pollution is fundamentally a regional scale phenomenon. Regional airshed models will persist as incomplete aids to state implementation plans (SIPS) until the influence of the rural - urban 03 transport is incorporated into them, i.e., over half the content in urban plumes exceeding NAAQS is thought to be transported from rural surroundings.   A public networking of sites using a simplified passive sampling device (PSD) for ozone could provide a longer term, highly resolved data base of regional scale 03 measurements to the modeler, a scenario that is not currently plausible with real-rime monitoring because of economic and operator constraints. In conjunction/collaboration with EPA Region 6, a lay network of 30 PSD sites (acronym POND, Le., Passive Ozone Network of Dallas) in and surrounding the Dallas-Ft.Worth area, a region bounded by 16 counties, successfully measured daily ozone on 24 and 96 hr schedules during eight weeks of the high ozone season (July 13 through September 4, 1998). Site operators included volunteers from Region 6 personnel, service organizations such as the 4-H Club and Master Gardeners as well as farm retirees selected by county extension agents. The data from 2880 measurements clearly indicate that a concerned public, when properly trained, can successfully operate a large PSD network that requires daily sample handling and weekly mailing procedures. PSD values from four collocated real-time monitoring sites yielded excellent correlations during the eight week period (r2 range = 0.90 to 0.97). An EPA video was developed for the generic training of the laysite operators (EPA/600-V-98/001).   This abstract has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Liu, S, and Pleil, J.D. Blood extraction experiments for measuring human exposure to JP-8 jet fuel. Abstract presented at: 217th Meeting of the American Chemical Society, Anaheim, CA, March 15-19, 1999.

3/1/1999

Contact: Joachim D. Pleil

Abstract:

Lewis, R.G. Monitoring multi-route exposures of children to pesticides in the home environment. Pittsburgh Conference, Orlando, FL, March 10, 1999.   3/10/1999

Contact: Robert G. Lewis

Abstract:

Zartarian, V. A physically-based stochastic model for estimating dermal and non-dietary   3/29/1999
ingestion exposure and dose. Presented at: Environmental and Occupational Health Sciences
Institute, Piscataway, NJ, March 29, 1999.

Contact: Valerie G. Zartarian morrison

Abstract:

Zartarian, V. The population SHEDS (Stochastic Human Exposure and Dose Simulation) model   10/19/1999
for pesticides. Presented at: Aggregate Exposure Assessment Model Evaluation and Refinement
Workshop, Baltimore, MD, October 19, 1999.

Contact: Valerie G. Zartarian morrison

Abstract:

Ozkaynak, H. Framework for model evaluation and validation. Presented at: Aggregate   10/19/1999
Exposure Assessment Model Evaluation and Refinement Workshop, Baltimore, MD, October
19-21, 1999.

Contact: Vance R. Highsmith

Abstract:

Zartarian, V., Ozkaynak, H., Burke, J.M., Zufall, M.J., Rigas, M.L., and Furtaw, Jr., E.J. A   9/7/1999
modeling framework for estimating children's residential exposure and dose to chlorpyrifos via
dermal residue contact and non-dietary ingestion. Presented at: ISEE/ISEA '99 Conference,
Athens, Greece, September 5-8, 1999.

Contact: Valerie G. Zartarian morrison

Abstract:

Wilson, N.K. PAH exposures of preschool children and their adult caregivers. Presented at: 9/22/1999
NIG/NIEHS Workshop on the Role of Human Exposure Assessment in the Prevention of
Environmental Disease, Rockville, MD, September 22-24, 1999.

Contact: Nancy K. Wilson

Abstract: The results of four small studies of the polycyclic aromatic hydrocarbon (PAH) exposures
of preschool children in low-income families from the Piedmont area of North Carolina were
combined to allow comparisons of the total exposures of the children and their adult
caregivers. Indoor and outdoor air, house dust, play area soil, and food and beverages were
analyzed for PAH. Total exposures to the targeted PAH were calculated from the
environmental levels, activity diary information, and assumed ventilation volumes and
dust/soil ingestion masses (Exposure Factors Handbook, EPA, 1996). The most important
exposure pathway for total PAH exposure, which includes exposures to the volatile PAH such
as naphthalene and anthracene and also to the nonvolatile PAH such as benzo[a]pyrene, was
inhalation by adults and children. For the nonvolatile B2 PAH (probable human carcinogens,
International Agency for Research on Cancer), dietary ingestion was most important for both
adults and children, while inhalation was least important for children and secondarily important
for adults. The potential doses of B2 PAH for 24 children ranged from 12.2 to 107 ng/kg body
weight/day; for the 24 adults in the same households these ranged from.4.12 to 62.0 ng/kg
body weight/day. The mean B2 PAH potential dose for the children was approximately two
times that of the adults.   This abstract has been reviewed in accordance with the U. S.
Environmental Protection Agency's peer and administrative review policies and approved for
publication. Mention of trade names or commercial products does not constitute endorsement
or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Vallero, D.A., Stockburger, L., Farnsworth, J.L., and Peirce, J.J. Measuring the transport of endocrine disrupting dicarboximides and degradation products from the soil to the lower troposphere. Presented at: International POPs Workshop, Research Triangle Park, NC, October 5-7, 1999.

10/5/1999

Contact: Daniel A. Vallero

Abstract: A method for measuring the atmospheric flux of a dicarboximide and its degradation products was investigated. A volatile gas laboratory chamber was modified to measure the flux of semi-volatile fungicides. Pesticide application systems and soil incorporation systems were designed and added to the chamber. The dicarboximides were collected using polyurethane foam plugs. A protocol was developed for chemical extraction, separation, and detection of dicarboximides. Concentration gradients were determined for semi-volatile organic compounds in a pesticide spray in the chamber. Experimental results demonstrated that polyurethane foam is an efficient trapping medium for dicarboximides. Sample flow rate is a major factor in the amount of dicarboximide mass breaking through the foam. Supercritical fluid extraction (SFE) was demonstrated to effectively remove the compounds from foam for chemical separation and detection. The SFE factors were optimized for recovering dicarboximides from porous media in the chamber. The factors varied by compound and type of porous media, but methanol modification appears to improve extraction efficiencies of soil-bound dicarboximides.

Vallero, D.A., and Foley, G.J. North America's sound management of chemicals initiative: application of selection criteria to dioxins/furans, hexachlorobenzene, and hexachlorocyclohexanes. Presented at: International POPS Workshop, Research Triangle Park, NC, October 5-7, 1999.

10/5/1999

Contact: Daniel A. Vallero

Abstract:

Ozkaynak, H., Xue, J., Spengler, J.D., Parise, H., Privalova, L., Brezgina, S., Katsnelson, B., Kuzmin, S., Voronin, S., and Kosheleva, A. Acute effects of air pollution on respiratory symptoms and peak flow measurements of symptomatic and asymptomatic children in Nizhni Tagil, Russia. Presented at: PM 2000 Program Committee Meeting, Salt Lake City, UT, October 3-4, 1999.

10/3/1999

Contact: Haluk Ozkaynak

Abstract: A panel study with 85 elementary school children of 9 to 11 years old was carried out during March 16 - May 16, 1998 in Nizhni Tagil, Russia. All of the children were recruited from a single school and their respiratory health status was characterized through questionnaires and by a local pediatric asthma and broncho-obstructive symptoms (BOS) specialist. Forty-two (42) children were diagnosed as having one of the BOS conditions: symptoms or diagnoses of bronchial obstruction or asthma, or severe chest cold lasting over 10 days in the past year. Daily respiratory symptom diaries and twice-daily peak flow measurements were obtained froze each child. Concurrent daily PM10, PM2.5, SO2 and NO2 measurements were collected at the school studied. Harvard impactors were used to measure PM. NO2 and SO2 were measured using passive Yanagisawa and Ogawa badges, respectively. Analysis of the association between changes in the daily air pollution levels and the upper (URS) or lower (LRS) respiratory symptoms was performed using generalized estimating equations (GEE) procedures with SAS software. All of the GEE logistic regression model specifications controlled for age, gender, temperature, humidity, time trend, fever and BOS status. The results showed statistically significant associations between PM10 or PM2.5 in the preceding day and increased incidence of URS in the following day (about 6% increase associated with an inter-quartile range pollution value of 6 ug/m3 PM2.5 or 9 ug/m3 PM10. Statistically significant associations were also detected among PM10, PM2.5, NO2, SO2 and LRS; however, these results were less robust and depended on the particular time lags selected for the temperature and the relative humidity variables.   The analysis of the fluctuations in the morning or evening PEF measurements failed to show any statistically significant associations between these lung function measures and short-term changes in any of the pollution measures collected.   This abstract has been reviewed in accordance with the U. S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Vallero, D.A., Stockburger, L., Farnsworth, J.L., and Peirce, J.J. Measurement and modeling of the transport of endocrine disrupting dicarboximides and degradation products from the soil to the lower troposphere. Presented at: Seventh Symposium on the Chemistry and Fate of Modern Pesticides, Lawrence, KS, September 14-16, 1999.

9/14/1999

Contact: Daniel A. Vallero

Abstract: This research addresses the environmental fate, transport, exposure and potential risks from dicarboximides, a widely used class of agricultural fungicides. Certain dicarboximide fungicides and degradation products have been found to be anti-androgenic; i. e., exposure to these compounds are associated with depressed levels of male hormones in animals. The compounds are semivolatile, so that the gas phase is a potentially important human exposure pathway. Dicarboximides are also strongly lipophilic, so that they have a high potential for bioaccumulation and persistence following their release to the environment. The study addresses the physical and chemical conditions affecting the soil-to-troposphere dicarboximide flux through controlled laboratory chamber experiments. This research extends Duke's research in the flux of oxides of nitrogen to the more complicated mass balance and chemical equilibria of the parent fungicide, vinclozolin, and its three principal degradation products, an enanilide, a butenoic acid, and 3,5-dichoroanaline. The redesigned chamber employs innovative spray application, soil incorporation, and fungicide monitoring and collection systems, which will be described. Other topics will include the protocol for chemical extraction, separation, and detection of dicarboximides, geostatistical techniques for quantitating soil mixing, and water balances. Experimental results will be interpreted and endocrine risk modeling discussed. This abstract has been reviewed in accordance with the United States Environmental Protection Agency peer and administrative review policies and approved for presentation arid publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Vallero, D.A., and Foley, G.J. North America's sound management of chemicals initiative: application of selection criteria to dioxins/furans, hexachlorobenzene, and hexachlorocyclohexanes. Workshop on Persistent Organic Pollutants and Heavy Metals, Research Triangle Park, NC, October 5-7, 1999.

10/5/1999

Contact: Daniel A. Vallero

Abstract: In October 1997, the North American Commission for Environmental Cooperation finalized its process for identifying candidate substances for regional action under the Sound Management of Chemicals Initiative. Regional action plans will be prepared if substantive risk to human health or the environment in Mexico, Canada, and the U.S. is understood and shared among the three parties, and that actions would lead to benefits in all three countries. The selection criteria are based upon a substance's persistence, bioaccumulation (including both bioavailability and bioconcentration), and toxicity. The three-stage process consists of nomination of a substance, evaluation (screening and mutual concern), and discussion/decisions on whether to prepare an action plan. The process has recently been successfully applied to dioxins/furans and hexachlorobenzene, and is presently be applied to hexachlorocyclohexanes, especially the gamma isomer, lindane. The lessons learned by scientists and decision-makers from these selections will be discussed.   This work has been funded wholly by the United States Environmental Protection Agency. It has been subjected to Agency review and approved for publication.

Jan 1, 1999 - Dec 31, 1999

Lindstrom, A.B., Waidyanatha, S., Yeowell-O'Connell, K., and Rappaport, S.M. Benzene oxide protein adducts as biomarkers of benzene exposure. Presented at: EPA/NIEHS In-House Workshop Biomarkers: Taking Stock, Chapel Hill, NC, August 30-31, 1999.

Contact: Andrew B. Lindstrom

Abstract: Benzene is known to be hematotoxic and carcinogenic in animals and humans. While metabolism is required for toxicity, the identity of the ultimate carcinogen(s) remains unknown. Benzene oxide (BO) is the first and most abundant of the metabolites, but very little is known about its production, disposition, or toxicity. As described below, a variety of techniques were used to investigate fundamental aspects of BO metabolism, with a principal goal being a determination of the tissue dose to the blood and bone marrow following exposure to benzene. In initial experiments the overall reactivity of BO in the blood of mice, rats, and humans was determined. Benzene was then administered to rats and the time-dependent BO concentrations in blood were measured, providing the first unambiguous demonstration that BO was produced and distributed throughout the body via the bloodstream. The second-order rates of reaction for BO with the cysteine thiol groups of hemoglobin (Hb), albumin (Alb), and bone marrow proteins were estimated thereby providing a means to predict the BO tissue dose using BO-protein adduct levels determined in animal and human studies. To further assess BO production and distribution, microsomes from various tissues of control and acetone-treated rats were prepared and used in experiments to examine potential BO production. Additional experiments conducted to examine the origins of background BO-protein adducts indicated that common oxidative reactions can activate benzene and endogenous metabolites to produce reactive species which ultimately form protein adducts identical to those formed with BO.

Howard-Reed, C., Wallace, L.A., and Ott, W.R. Factors affecting air exchange in two houses. Presented at: ISEE/ISEA '99 Conference, Athens, Greece, September 5-8, 1999.

Contact: Cynthia H. Reed

Abstract: Air exchange rate is critical to determining the relationship between indoor and outdoor concentrations of hazardous pollutants. Approximately 150 air exchange experiments were completed in two residences: a two-story detached house located in Redwood City, CA and a three-story town home located in Reston, VA. A continuous monitor (Bruel & Kjaer) measured the decay of sulfur hexafluoride over periods of 5 to 20 hours. Different seasons, temperatures, central fan usage, and window opening configurations were studied. Each experiment included a measurement of the air exchange rate first with all exterior doors and windows closed, then with a window open to a specific width. For 50 experiments, air exchange rates were measured in multiple locations of the homes. For both homes, air exchange rates measured during closed conditions (i.e., no exterior doors or windows open) ranged from 0.25/hr to 1.0/hr. For the Reston home, an 8 F increase in the difference between indoor and outdoor temperature led to a 0.1 /hr increase ($R2 = 0.43$) in the closed condition air exchange rate. A more significant impact on air exchange was achieved by opening a single window 0.5 to 20 inches. For example, a 0.1/hr increase in air exchange was achieved by opening a single window 1 inch. This response was observed to be linear up to 5 inches in. both homes, after which an upper limit asymptote was reached. Air exchange rates were also measured at different locations to determine the extent of mixing within each house. Results showed multiple compartments existed for conditions of increased indoor/outdoor temperature difference and when a single window was opened. A three compartment mass balance model was used to investigate the Reston results.   This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Vallero, D.A., and Peirce, J.J. Measuring and modeling the transport of endocrine disrupting dicarboximides and degradation products from the soil to the lower troposphere. Presented at: The Conference on Chromatography Environmental, Lawrence, KS, September 13-16, 1999.

9/13/1999

Contact: Daniel A. Vallero

Abstract: This research addresses the environmental fate, transport, exposure and potential risks from dicarboximides, a widely used class of agricultural fungicides. Certain dicarboximide fungicides and degradation products have been found to be anti-androgenic; i. e., exposure to these compounds are associated with depressed levels of male hormones in animals. The compounds are semivolatile, so that the gas phase is a potentially important human exposure pathway. Dicarboximides are also strongly lipophilic, so that they have a high potential for bioaccumulation and persistence following their release to the environment. The study addresses the physical and chemical conditions affecting the soil-to-troposphere dicarboximide flux through controlled laboratory chamber experiments. This research extends Duke's research in the flux of oxides of nitrogen to the more complicated mass balance and chemical equilibria of the parent fungicide, vinclozolin, and its three principal degradation products, an enanilide, a butenoic acid, and 3,5-dichoroanaline. The redesigned chamber employs innovative spray application, soil incorporation, and fungicide monitoring and collection systems, which will be described. Other topics will include the protocol for chemical extraction, separation, and detection of dicarboximides, geostatistical techniques for quantitating soil mixing, and water balances. Experimental results will be interpreted and endocrine risk modeling discussed. This abstract has been reviewed in accordance with the United States Environmental Protection Agency peer and administrative review policies and approved for presentation arid publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

McCurdy, T.R., Nelson, W.C., Lakkadi, Y., Glenn, G., Smith, L., del Valle-Torres, M., and Trippett, J.A. The National Exposure Research Laboratory's comprehensive human activity database. Presented at: International Society of Exposure Analysis, Athens, Greece, September 5-8, 1999.

9/5/1999

Contact: Thomas R. Mccurdy

Abstract: EPA's National Exposure Research Laboratory (NERL) has combined data from nine U.S. studies related to human activities into one comprehensive data system that can be accessed via the world-wide web. The data system is called CHAD-Consolidated Human Activity Database-and it is available at http:/epa.gov/   CHAD contains almost 17,000 person-days of activity. All ages and both genders are included in the database, and information regarding every activity undertaken during a day is included in sequential order. For each person in CHAD, the day goes from midnight-to-midnight. Three types of data are available for each Risk Assessment activity: a "macro" location code, an activity code, and an estimate of the metabolic (energy) cost of the activity. Thus, the data are suitable for modeling the time sequence of acute exposures and intake doses, or the data can be aggregated for longer time periods within a day.   CHAD uses about 140 activity codes and 110 location codes, but data are not available for all of these items for all studies; therefore, both sets of codes are organized in a hierarchal manner so that detailed data can has been used if available. Otherwise an aggregated category (e.g., "residence indoor" rather than "kitchen") must be used. Energy expenditureestimates available for each activity are in terms of METS: metabolic equivalents of work normalized to a person's basal metabolic rate. The METS estimates also account for the phenomenon of EPOC: excess post-exercise oxygen consumption, so that better accounting for energy expenditure after a large exercise event can be accomplished. The paper includes an example of how CHAD can be used to provide estimates of inhalation and ingestion intake rates for children.   This work has been funded wholly or in part by the United States Environmental Protection Agency under contract 68-D5-0049 to ManTech Environmental Technology, Inc. It has been subjected to Agency review and approved for publication.

Jan 1, 1999 - Dec 31, 1999

Burke, J.M., McCurdy, T.R., Ozkaynak, H., and Sheldon, L.S. Analysis of human activity data for use in modeling environmental exposures. Presented at: American Association of Aerosol Research, Tacoma, WA, October 11-15, 1999.

10/11/1999

Contact:　Vance R. Highsmith

Abstract:　　Human activity data are a critical part of exposure models being developed by the US EPA's National Exposure Research Laboratory (NERL). An analysis of human activity data within NERL's Consolidated Human Activity Database (CHAD) was performed in two areas relevant to exposure modeling.   First, activity data in CHAD were analyzed to investigate the microenvironment and activity data currently available for children. Activity data from CHAD for approx. 2600 children less than 12 years old were incorporated in the analysis (approx. 200 children for each year of age). The amount of time spent by children doing certain activities in various microenvironments (i.e. playing games in living room) was compared to determine appropriate age groupings for modeling children's exposure to pesticides. This analysis identified significant data gaps in the CHAD activity data for children, including specific activities relevant to dermal exposure (i.e. contact with surfaces). Also, data on time spent in a childcare facility was limited to one California study. Second, day-to-day longitudinal variability in activity patterns was investigated using multi-day diaries available in CHAD for approximately 850 people. The auto-correlation between the percent of day spent in various activities and microenvironments across three consecutive diary days was found to be dependent on age, type of day (weekday/weekend) and month (March/August). Longitudinal variability in activity patterns has implications for modeling annual average exposures to many pollutants, such as ambient particulate matter.   This is a proposed abstract and does not necessarily reflect U.S. EPA policy.

Wilson, N.K. Studies of preschool children's exposures to pesticides. Presented at: Department of Toxicology, North Carolina State University, Raleigh, NC, March 16, 1999.

3/16/1999

Contact:　Nancy K. Wilson

Abstract:　　Young children, especially those of the preschool ages, are hypothesized to have greater exposures than do older children or adults to persistent organic pesticides and other persistent organic pollutants, including some compounds that may have endocrine-disrupting effects or developmental toxicity. These greater exposures may result from what children eat and drink, where they spend their time, and what they do there. The impact of the exposures may be greater on young children because of their smaller body masses, immature body systems, and rapid physical development. Very young children learn about their environment by exploring not only the appearance and texture of objects, but also their taste and smell. Thus nondietary ingestion can play an important role in their exposures.   We will discuss the results of two small pilot studies of pre-elementary school children's total exposures to persistent organic compounds at home and at day care through the ingestion, inhalation, and dermal absorption pathways. The measured chemicals include polycyclic aromatic hydrocarbons; chlorinated and organophosphate pesticides; phthalate esters; phenols; and polychlorinated biphenyls. The specific compounds were selected because they are carcinogenic, mutagenic, acutely or chronically toxic, or potentially disruptive to the human endocrine system; and because they are widespread and often persistent in the indoor or outdoor environment. We will relate the findings of the pilot studies to a planned study of the exposures of approximately 250 children, which is expected to be underway early next year.

　　The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under Contract 68-D4-0023 to Battelle. It has been subjected to Agency review and approved for publication.

Jan 1, 1999 - Dec 31, 1999

Cohen-Hubal, E.A., and Sheldon, L.S. Data requirements for assessing children's exposure to pesticides. Presented at: ACS National Meeting, New Orleans, LA, August 23, 1999.

8/23/1999

Contact: Linda S. Sheldon

Abstract: Several multimedia, multipathway exposure monitoring studies are currently being planned within EPA/NERL. The overall objectives of these studies are (1) to develop the data and models that can be used to estimate exposure and dose for young children to pesticides and (2) to identify and quantify important exposure factors for young children.   To meet these objectives, data will be collected on pesticide concentrations in environmental media and on children's activity patterns. Data collection will focus on those microenvironments where children spend most of their time. These data will then be used as multipathway model inputs to estimate exposures. Concentration of urinary biomarkers will also be measured. These data will be combined with PBPK models to develop a second estimate of exposure. Comparisons between the two estimates will be used to evaluate and refine the various models. Given these objectives, a preliminary modeling approach was developed and used to identify data needs and to guide field sample collection. This approach ensures that samples and questionnaire information collected in these studies will provide the necessary data for assessing children's exposures to pesticides.   The U.S. Environmental Protection Agency through its Office of Research and Development funded and managed the research described here. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute an endorsement or recommendation for use.

Sheldon, L.S., Cohen-Hubal, E.A., and Berry, Jr., M.R. Children's exposure research strategy in support of FQPA. Presented at: ACS National Meeting, New Orleans, LA, August 23, 1999.

8/23/1999

Contact: Linda S. Sheldon

Abstract: The Food Quality Protection Act (FQPA) requires that multimedia, multipathway exposure assessments for children be conducted when setting food tolerances for pesticides. EPA/NERL (National Exposure Research Laboratory) has developed a framework to systematically identify and address the most important exposure research needs for children. Objectives of our research are (1) to identify those pesticides, pathways, and activities that represent the highest potential exposures; (2) to determine the factors that influence exposures; (3) to develop methods for measuring multimedia exposures that account for children's activities; and (4) to generate data on multimedia pesticide concentrations, pesticide biomarkers, and exposure factors that can be used as inputs to aggregate exposure models. At the outset, a simple conceptual model for children's exposure to pesticides was developed. A literature review and workshop were conducted to identify those pesticides, microenvironments, and activities that represent the highest exposure risks. Research studies were designed to fill the most important data gaps. Information will be provided on the conceptual model, important data gaps, and research studies that will be conducted.   The U.S. Environmental Protection Agency through its Office of Research and Development funded and managed the research described here. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute an endorsement or recommendation for use.

Wallace, L.A., Howard-Reed, C., Zartarian, V., and Ott, W.R. Clothes as a source of particles contributing to the "personal cloud". Presented at: ISEE/ISEA '99 Conference, Athens, Greece, September 5-8, 1999.

9/5/1999

Contact: Vance R. Highsmith

Abstract: Previous studies such as EPA's PTEAM Study have documented increased personal exposures to particles compared to either indoor or outdoor concentrations--a finding that bas been characterized as a "personal cloud." The sources of the personal cloud are unknown, but could include proximity to important sources such as smoking, cooking, and the automobile, shedding of skin flakes, resuspension of particles from walking on carpet or sitting on upholstered furniture, static electricity, or other possibilities. Some investigators have previously identified particles from clothes as an important source of workplace exposures. Our objective was to identify the contribution of particles from clothes to personal exposure. We employed an MIE personal monitor using optical scattering to detect particles in the 0.5-5 micrometer range. The approach was to perform certain repetitive procedures (turning sweaters inside out, performing physical activities) while wearing the personal monitor and measuring with identical fixed indoor monitors at different distances away. Significant increases in particle exposures were recorded for clothes such as sweaters, shirts, and pants. Dry cleaning greatly reduced the particle levels produced by a sweater, and commercial laundering reduced the levels from shirts, but home laundering did not reduce levels from a cotton sweater. We conclude that particles deposit on clothes and can then be shaken off to contribute to personal exposure.   This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Zartarian, V., Ozkaynak, H., Burke, J., Zufall, M.J., Furtaw, E.J., Jr., Cohen-Hubal, E.A., and Sheldon, L.S. Modeled residential chlorpyrifos exposure and dose to children via dermal surface residue contact and non-dietary ingestion. Presented at: ISEE/ISEA '99 Conference, Athens, Greece, September 5-8, 1999.

Contact: Vance R. Highsmith

Abstract: A physically-based stochastic model has been applied to estimate residential chlorpyrifos exposure and dace to children via the non-dietary ingestion and dermal residue contact pathways. Time-location-activity data for 2825 children were sampled from national surveys to generate a population of simulated children. For each individual, a sequence of objects contacted was generated probabilistically for every location-activity combination, based on available microlevel) videotape data of children, yielding daily sequential activity profiles in 5 second increments. Based on a literature review, probability distributions were assigned to residue concentrations for each object, surface-to-skin residue transfer efficiency, saliva and water removal efficiency, and skin surface area contacted. The daily activity time profiles were combined with concentrations and exposure factors to yield daily profiles of dermal loading versus time, which were entered into a new dermal uptake model. Monte Carlo sampling was applied to produce estimates of dermal and non-dietary ingestion exposure and dose distributions for young children.   Exposure and dose by age-gender category are presented. Resulting daily averages of intake dose are compared to concentrations in urine of 3,5,6-trichioro-2-pyridinol (TCP), a metabolite of chlorpyrifos, measured in children in EPA's NHEXAS. A sensitivity analysis reveals that more data are needed on transfer and removal efficiencies, surface area contacted, and duration and frequency of objects contacted. This first generation residential exposure modeling approach will soon be extended to aggregate exposure and rinse over all routes and pathways.

Sheldon, L.S., Berry, M.R., and Vallero, D.A. Bioaccumulation of POPS in fish and estimation of human dietary exposure and dose. Presented at: ISEE/ISEA '99 Conference, Athens, Greece, September 5-8, 1999.

Contact: Vance R. Highsmith

Abstract: The risk assessment process is fundamental in understanding and controlling environmental health risks. Risk assessment includes four steps: hazard identification, dose-response assessment, exposure assessment, and risk characterization. Exposure assessments seek to characterize "real-life" situations whereby (1) potentially exposed populations are identified, (2) potential pathways of exposure are identified, and (3) the magnitude, frequency, and duration of chemical intakes/potential doses are quantified.   For many of the persistent organic pollutants (POPS), the primary route of exposure is through the diet. As an example, 90% of dioxin exposures for the general population comes from the dietary consumption of animal products including meats, fish, eggs, and diary products. Some of the highest exposures are believed to come from the ingestion of contaminated fish. Subpopulations at risk for this type of exposure may include low income individuals who rely on fish for their dietary needs, native Americans or other ethnic groups who have cultural traditions of consuming large quantities of fish, commercial anglers and recreational anglers. This paper will review information on POPS concentrations in fish. It will also evaluate data of fish consumption behaviors for several populations with higher than average levels of consumption. This information will be used to identify those populations with the highest potential exposures, quantitate their exposures, and evaluate the dose and potential health risks that can result.   This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Zufall, M.J., Ozkaynak, H., Brauer, M., Ott, W.R., Ryan, J., and Spengler, J. Particulate matter concentrations in non-residential microenvironments. Presented at: American Association of Aerosol Research, Tacoma, WA, October 11-15, 1999.

10/11/1999

Contact: Vance R. Highsmith

Abstract: Exposures to airborne particulate matter (PM) have long been associated with increases in both acute and chronic human health effects. Traditionally, research and regulations have focused on outdoor air pollution. However, human activity pattern studies show that people are indoors 90% of the time, with more than 20% of that time in locations other than their home. Therefore, to assess total human exposure to particulate matter, it is necessary to determine airborne concentrations and their sources in different types of indoor microenvironments. A literature review was conducted of studies that measured PM10 and PM2.5 concentrations in various nonresidential indoor microenvironments. The results of these studies show that PM levels are different in indoor locations than outdoors depending on air handling and filtration systems and local sources. Concentrations in offices and stores are generally similar to or less than ambient levels. Measurements in restaurants and vehicles are up to 5 times greater than outdoor concentrations. The highest indoor concentrations are found in locations where environmental tobacco smoke is present. Bars and restaurants with smokers often have concentrations 7 times greater than outdoors, while smoking lounges may be up to 15 times greater.   The results of measurements in these and other microenvironments and their relationship with ambient concentrations will be used as inputs to a probabilistic model for human exposure to particulate matter. Future research needs are also identified for collecting measurements from locations where people spend significant time periods, but where limited monitoring data are currently available.   This is a proposed abstract and does not necessarily reflect U.S. EPA policy.

Burke, J., McCurdy, T.R., Ozkaynak, H., and Sheldon, L.S. Analysis of human activity data for use in modeling environmental exposures. Presented at: Third Colloquium on Particulate Air Pollution and Public Health, Durham, NC, June 6-8, 1999.

6/6/1999

Contact: Vance R. Highsmith

Abstract: Human activity data are a critical part of exposure models being developed by the US EPA's National Exposure Research Laboratory (NERL). An analysis of human activity data within NERL's Consolidated Human Activity Database (CHAD) was performed in two areas relevant to exposure modeling. First, activity data in CHAD were analyzed to investigate the microenvironment and activity data currently available for children. Activity data from CHAD for approx. 2600 children less than 12 years old were incorporated in the analysis (approx. 200 children for each year of age). The amount of time spent by children doing certain activities in various microenvironments (i.e. playing games in living room) was compared to determine appropriate age groupings for modeling children's exposure to pesticides. This analysis identified significant data gaps in the CHAD activity data for children, including specific activities relevant to dermal exposure (i.e. contact with surfaces). Also, data on time spent in a childcare facility was limited to one California study. Second, day-to-day longitudinal variability in activity patterns was investigated using multi-day diaries available in CHAD for approx. 850 people. The auto-correlation between the percent of day spent in various activities and microenvironments across three consecutive diary days was found to be dependent on age, type of day (weekday/weekend) and month (March/August). Longitudinal variability in activity patterns has implications for modeling annual average exposures to many pollutants, such as ambient particulate matter. This is a proposed abstract and does not necessarily reflect U.S. EPA policy.   This paper has been reviewed in accordance with the U.S. Environmental) Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does nor constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Williams, R., Creason, J., Zweidinger, R.B., Suggs, J.C., Kwok, R., and Sheldon, L.S. Exposure analysis from personal and ambient air sampling: results of the 1998 Baltimore study. Presented at: Third Colloquium on Particulate Air Pollution and Public Health, Durham, NC, June 6-8, 1999.

Contact: Vance R. Highsmith

Abstract: An integrated epidemiological-exposure panel study was conducted during July-August 1998 which focused upon establishing relationships between potential human exposures to particulate matter (PM) and related co-pollutants with detectable health effects. The study design incorporated repeated 24-hour integrated PM2.5 personal exposure measures as well as a variety of both integrated and continuous PM2.5 and PM10, monitoring. A total of 305 PM2.5 personal exposure samples were obtained over the four week study period using a subject pool of twenty-one elderly residents of an eighteen story retirement facility near Baltimore, Maryland. Each sample represented a unique 24-hour breathing-zone measurement of PM2.5 mass concentration. Matched PM2.5 and PM10 micro-environmental measures were obtained on at least an every-other-day schedule in the apartments of those participating in personal monitoring. Likewise, daily residential indoor, residential outdoor, and community platform measures were taken to investigate spatial variation of PM mass concentration. Results indicated that the PM2.5 size fraction was responsible for >86 % of collected indoor PM10 mass. Daily PM2.5 personal exposure concentrations ranged from 2.4 to 47.8 ug/m3 with an overall individual study mean of 12.9 ug/m3. The mean values from 15 days of apartment monitoring was 10.1 ug/m3, with mean residential indoor and outdoor concentrations of 9.5 and 22.1 ug/m3, respectively. Individual correlation (r2) of personal exposures to matched residential indoor PM2.5 measures ranged from 0.31 to 0.96 with a mean of 0.74. The mean correlation of personal exposures to residential outdoor PM25 concentration was 0.78.
This is a proposed abstract and does not necessarily reflect U.S. Environmental Protection Agency policy.

Williams, R., Creason, J., Zweidinger, R.B., Watts, R.R., and Shy, C.M. Results from exposure monitoring performed during the 1997 Baltimore PM pilot study. Presented at: Third Colloquium on Particulate Air Pollution and Public Health, Durham, NC, June 6-8, 1999.

Contact: Vance R. Highsmith

Abstract: An eighteen day winter-time ambient and personal exposure monitoring study of particulate matter (PM) was conducted as part of an.integrated epidemiological-exposure pilot study of an aged population. Goals of the study were to determine the feasibility of performing active personal exposure monitoring upon subjects over 65 years old living in a common retirement facility and to investigate activity patterns that might affect individual exposures. Daily measures of PM2.5 and PM,owere performed outside of the retirement center and at a community platform. Repeated PM2.5 measurements were conducted inside of the facility as a means to compare indoor/outdoor mass concentrations. Five elderly residents of a 3-story retirement facility were successfully recruited to wear PM,., active samplers on a MondaySaturday basis for three weeks (10 samples/subject) during the study period. Each sampling period represented a continuous 24-hour collection of potential breathing zone PM exposure. Collection of daily individual activity logs and survey questionnaires were utilized to develop activity profiles of all participants in the study. Results indicated that the outdoor PM,osize fraction was 82.7% PM2.5 by mass and that little spatial variation existed between indoor and outdoor concentrations of PM2.5(ratio of 0.80). PM,., personal exposure monitoring of an aged population was determined to be feasible with some individuals measured at levels approaching 60 pg/m' under certain activity profiles. Correlation of the average PM,.5personal exposure to the outdoor PM2.5 measure was r'=0.4521 (P=0.0472,n=9).   This is a proposed abstract and does not necessarily reflect U.S. Environmental Protection Agency policy.

Jan 1, 1999 - Dec 31, 1999

Ozkaynak, H., Zufall, M.J., Burke, J., Xue, J., and Zidek, J. Predicting population exposures to PM10 and PM 2.5. Presented at: Third Colloquium on Particulate Air Pollution and Public Health, Durham, NC, June 6-8, 1999.

Contact: Vance R. Highsmith

Abstract: An improved model for human exposure to particulate matter (PM), specifically PM10 and PM2.5 is under development by the U.S. EPA/NERL. This model will incorporate data from new PM exposure measurement and exposure factors research. It is intended to be used to predict exposure of the general population and susceptible subpopulations to PM from both ambient and other sources. Two-stage Monte-Carlo simulation techniques will be used to characterize uncertainty and variability in the various model parameters and inputs. The initial version of this model was applied to Vancouver, Canada, following the statistical spatial interpolation of ambient PM10, data, to predict the distributions of PM10 exposures of both indoor and outdoor origin by cohort, age, activity type and microenvironment category. Exposures in homes were modeled using the information derived from the PTEAM study. The preliminary results showed wide ranges in the predicted personal exposures of various population cohorts due to influences from different human activities and contributions from indoor sources, such as smoking or cooking. Limitations of available data on PM measurements in schools, commuting environments, and different public places were identified as important sources of model uncertainties. Data from a recent review of PM concentrations in various nonresidential microenviromnents will be used to improve model estimates of indoor PM exposures in offices, schools, restaurants, public places and during commuting. Other planned model improvements include utilization of the results of recent research on: infiltration of ambient PM indoors, the effects of a personal cloud on PM exposure, and linkage with ambient. air quality and dosimetric models.   This is a proposed abstract and does not necessarily reflect USEPA policy.

Howard-Reed, C., and Wallace, L.A. Continuous measurement of particles (0.01-20.0 um) in an occupied home, Reed and Wallace, AAAR.. Presented at: American Association of Aerosol Research, Tacoma, WA, October 11-15, 1999.

Contact: Vance R. Highsmith

Abstract: To better understand the contribution of outdoor and indoor sources to particle concentrations found in residential indoor air, an extensive monitoring effort has been undertaken in a three-story townhouse located in Reston, VA. Of particular interest was the determination of important indoor source's of particles for different size fractions. Data have been collected since November 1997 (SMPS) and April 1998 (APS) on particle concentrations and associated time activity information.   Typical household activities were found to generate particles spanning four orders of magnitude in size (0.01 u m 20 u m). A Scanning Mobility Particle Sizer (SMPS) was used to classify ultrafine particles (0.01 u m - 0.4 1 um) into 100 size categories. An Aerodynamic Particle Size (APS) was used to count particles in 52 channels from 0.3 um to 20 u m. The SMPS collected samples every five minutes and the APS collected samples every one minute. These relatively short sampling cycles provided detailed indoor particle concentration profiles including peak levels resulting from short bursts of activity. As a result, the dominant size fraction of particles and typical peak concentrations generated by typical household activities could be determined.   Sources that contributed the largest number of particles in this non-smoking home were combustion activities (candles, matches, incense) and cooking (frying, sauteeing, broiling, deep-frying, and stir-frying). Sources that generated ultrafine particles, as measured by the SMPS in this home, included the gas burners, gas oven, and electric toaster. The APS showed that combustion activities led to increases in primarily the fine particle size fractions (< 2.5 um) and cooking activities contributed to both fine and coarse fractions. Coarse particles were also generated during physical movement. Emission profiles of particle size and concentration were determined for about a dozen common indoor sources.   Decay rates were calculated for particles generated by a number of indoor sources. In some cases, concurrent calculation of air exchange rates using sulfur hexafluoride injection and photo acoustic detection (Bruel & Kjaer) allowed determination of deposition rates.   The research described in this abstract has been funded wholly or in part by the United States Environmental Protection Agency. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Wallace, L.A., and Howard-Reed, C. Indoor-outdoor relationships of particles, PAH, and black carbon in an occupied townhouse. Presented at: American Association of Aerosol Research, Tacoma, WA, October 11-15, 1999.

10/11/1999

Contact: Vance R. Highsmith

Abstract: Real-time instrumentation for measuring particles, PAH, and black carbon (soot) has been operated since May of 1998 in an occupied 3-story town house in Reston, VA. Indoor and outdoor concentrations have been measured every five minutes for the particles and black carbon and every minute for the PAR Temperature and relative humidity are measured every five minutes. Air exchange measurements utilizing SF6 as a tracer have been made on an intermittent basis (about 50 days during the year). A log of relevant activities was maintained to identify important sources. Important outdoor sources of PAH and black carbon were vehicle exhaust (morning rush hour only) and woodsmoke, although neither source was an important contributor to total particle concentrations. Indoor sources included candles, incense, and some types of cooking. Cooking also produced both fine and coarse particles. Physical activities produced mostly coarse particles. Profiles of particle size distributions and estimated source strengths were produced for a dozen or so common activities. In conjunction with the air exchange measurements, indoor particle deposition rates were determined for six size fractions between 0.3 and >10 micrometers in diameter. Indoor-outdoor correlations were very low for the coarse particles but were higher for the other target pollutants.   This research was sponsored by the U. S. Environmental Protection Agency. This abstract has been reviewed and approved by the Agency, but is not necessarily reflective of Agency policy.

Ozkaynak, H., Zartarian, V., Burke, J., Zufall, M.J., Cohen-Hubal, E.A., Sheldon, L.S., Buck, R., and Xue, J. Modeling multipathway exposures of children and adults to pesticides. Presented at: ISEE/ISEA '99 Conference, Athens, Greece, September 5-8, 1999.

9/5/1999

Contact: Vance R. Highsmith

Abstract: A probabilistic model of individual exposure to chlorpyrifos has been developed in support of the United States Environmental Protection Agency (US EPA) National Human Exposure Assessment Survey (NHEXAS) and the Food Quality Protection Act (FQPA) program. The model examines a variety of pathway to estimate the contribution of different exposure routes (ingestion, inhalation, dermal contact) and media (soil, dust, air, water, food and residues of pesticides on surfaces following application) to chlorpyrifos exposure. The model predicts exposures for individuals of all ages residing in the state of Arizona and children in the Minneapolis- St. Paul area between the ages of 2 and 12. The outputs from the model are generated by a two-stage Monte-Carlo simulation method. Both the uncertainty in each model parameter and the variability in the concentrations or exposure factors are explicitly simulated with this procedure. Preliminary model results show that non-acute (i.e. in the absence of recent applications) exposures to chlorpyrifos are most influenced by the dietary exposure pathway. The youngest age group is shown to have the highest potential exposures. In comparison, predicted acute and short-term (i.e. following recent application) residential exposures and dose from chlorpyrifos residues could be many times greater than the non-acute exposure values, depending on the type of residential pesticide application and the activities of the children. Both the variability and uncertainty in the predicted exposures are found to be very high.   This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Ozkaynak, H., Zufall, M.J., Burke, J., Xue, J., and Zidek, J. A probabilistic population exposure model for PM10 and PM 2.5. Presented at: ISEE/ISEA '99 Conference, Athens, Greece, September 5-8, 1999.

9/5/1999

Contact: Vance R. Highsmith

Abstract: A first generation probabilistic population exposure model for Particulate Matter (PM), specifically for predicting PM10, and PM2.5, exposures of an urban, population has been developed. This model is intended to be used to predict exposure (magnitude, frequency, and duration) of the general population and susceptible subpopulations to PM of ambient origin. Two-stage Monte-Carlo simulation techniques are used to characterize uncertainty and variability in the various model parameters and inputs.   The model has been applied to Vancouver, Canada, following the statistical spatial interpolation of the ambient PM10 data to predict the distributions of PM exposures by cohort, age, activity type and microenvironrnent category. Results show wide ranges in the predicted personal exposures of various population cohorts which are influenced by the different human activities and the contributions from indoor sources, such as smoking or cooking. Limitations of available data on indoor and outdoor PM measurements in schools ,commuting environments, and different public places are among some of the important sources of model uncertainties.Model refinements will incorporate the data from new PM exposure measurement and exposure factors research. This work will be performed in-house by EPA, as well as through the cooperative agreements recently initiated with two different University Consortia; UC Berkeley/LBL, CA and EOHSI, NJ.   This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Williams, R.W., Creason, J.P., Zweidinger, R.B., Suggs, J.C., Kwok, R.K., and Sheldon, L.S. Personal exposure and ambient air sampling related to an elderly population living in a Baltimore retirement center: preliminary findings of the 1998 Baltimore study. Presented at: ISEE/ISEA '99 Conference, Athens, Greece, September 5-8, 1999.

9/6/1999

Contact: Vance R. Highsmith

Abstract: The 1998 Baltimore PM Epidemiology-Exposure Study was conducted during the summer of 1998 with a goal of performing exposure assessment of PM and related copollutants involving a potentially susceptible population living in a retirement facility.   A total of 305 PM2.5, personal exposure samples were obtained over a four week study period using a subject pool of twenty-one elderly residents of an eighteen-story retirement facility near Baltimore, Maryland. Each sample represented a unique twenty-four hour breathing-zone measurement of PM2.5 mass concentration.   Matched micro-environmental PM2.5, and PM10 measures were obtained on at least an every-other-day schedule in the apartments of those participating in personal monitoring. Likewise, residential indoor, residential outdoor, and community platform measures were taken on a daily basis to investigate spatial PM mass concentration variation. Preliminary findings from indoor measurements indicate the presence of an abundance of fine particles with at least a 0.86 PM2.5,/PM10 mass ratio observed daily. PM2.5 personal exposure concentrations ranged from 2.4 to 47.8 ug/m3 daily with an overall individual study mean of 12.9 ug/m3. The mean value for 15 days of apartment monitoring was 10.1 ug/m3 with residential indoor and outdoor concentrations of 9.5 and 22.1 ug/m3, respectively. Mean PM2.5 concentrations inside monitored apartments indicated that the concentration differences were very small (0.1 ug/m3) and not statistically significant. However, statistical differences were observed between the mean personals and the common indoor site (+3.5 ug/rn3 , p=0.0001) as well as between mean personals and subjects apartments (+2.8 ug/m3 , p=0.0001).   This paper has been reviewed in accordance with the U.S.Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Cohen-Hubal, E.A., Burke, J.M., Zufall, M.J., Ozkaynak, H., and Sheldon, L.S. Important pathways and factors for assessing children's residential exposure to pesticides. Presented at: ISEE/ISEA '99 Conference, Athens, Greece, September 5-8, 1999.

9/5/1999

Contact: Vance R. Highsmith

Abstract: The Food Quality Protection Act of 1996 requires a reasonable certainty that no harm will result to infants and children from aggregate exposure to a pesticide's residues. To assess aggregate exposure, important pathways must be identified and quantified. In this study, currently available data were used to identify potentially important exposure pathways and the factors to which the exposure assessments are most sensitive.   Data available to assess children's residential exposures to pesticides were reviewed. An example pesticide was used to systematically explore and compare exposure pathways and factors. Potential for exposure and uncertainty associated with exposure pathways were evaluated using two approaches. In the first case, where enough data was available for given factors: uncertainty and variability were characterized, sensitivity of a screening level exposure assessment to the factors was determined, and the relative importance of pathways described by these data was evaluated. In the second case, where the data were sparse, bounding estimates or currently applied default values were used to identify factors and pathways that are potentially important.   Pesticide exposure assessments performed using current default assumptions show that dermal contact and non-dietary ingestion are potentially important pathways for infants and children. However, due to significant data gaps these pathways are currently difficult to quantify.   Future research should be focused on collecting data to better quantify these pathways.   This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Zartarian, V. Human exposure: concepts, definitions, and EPA research initiatives. Presented at: Presentation for Johns Hopkins University School of Public Health, New York, NY, April 9, 1999.

4/9/1999

Contact: Thomas R. Mccurdy

Abstract:

Wilson, N.K., Chuang, J.C., and Lyu, C. Total PAH exposures of nine preschool children. Presented at: 17th International Symposium on Polycyclic Aromatic Compounds, Bordeaux, France, October 25-29, 1999.

10/25/1999

Contact: Nancy K. Wilson

Abstract: This study evaluates the influence of denuder sampling methods and filter collection media on the measurement of semi-volatile organic carbon (SVOC) associated with PM2.5. Two types of collection media, charcoal (activated carbon) and XAD, were used both in diffusion denuders and impregnated back-up filters in two different samplers, the VAPS and the PC-BOSS. The two organic diffusion denuders were XAD-coated glass annular denuders and charcoal-impregnated cellulose fiber filter (CIF) denuders. In addition, recently developed XAD-impregnated quartz filters were compared to CIF filters as back-up filter collection media. The two denuder types resulted in equivalent measurement of particulate organic carbon and particle mass. The major difference observed between the XAD and charcoal BOSS denuders is the higher efficiency of charcoal for collection of more volatile carbon. This more volatile carbon does not contribute substantially to the particle mass or SVOC measured as OC on quartz filters downstream of the denuders. This volatile carbon does result in high OC concentrations observed in charcoal filters placed behind quartz filters downstream of the XAD denuders and would result in overestimating the SVOC in that configuration.   This paper has been reviewed in accordance with the US Environmenal Protection Agency's peer and administrative review policies and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Ozkaynak, H. Modeling environmental exposures to particulate matter and pesticides. Presented at: International Meeting on Particulate Matter Exposures and Health Effects, London, United Kingdom, June 25, - July 3, 1999.

6/25/1999

Contact: Vance R. Highsmith

Abstract: This presentation describes initial results from on-going research at EPA on modeling human exposures to particulate matter and residential pesticides. A first generation probabilistic population exposure model for Particulate Matter (PM), specifically for predicting PM1o and PM2.5 exposures of an urban population has been developed. This model is intended to be used to (predict exposure (magnitude, frequency, and duration) of the general population and susceptible subpopulations to PM of ambient origin. Two-stage Monte-Carlo simulation techniques are used to characterize uncertainty and variability in the various model parameters and inputs. The model has been applied to Vancouver, Canada, following the statistical spatial interpolation of the ambient PM10 data to predict the distributions of PM exposures by cohort, age, activity type and microenvironment category. Results show wide ranges in the predicted personal exposures of various population cohorts which are influenced by the different human activities and the I contributions from indoor sources, such as smoking or cooking. A probabilistic model of individual exposure to chlorpyrifos has been developed in support of the US EPA's National Human Exposure Assessment Survey (NHEXAS) and the Food Quality Protection Act (FQPA) program. The model examines a variety of pathways to estimate the contribution of different exposure routes (ingestion, inhalation, dermal contact) and media (soil, dust, air, water, food and residues of pesticides on surfaces following application) to chlorpyrifos exposure. The model predicts exposures for individuals of all ages residing in the state of Arizona and children in the Minneapolis- St. Paul area between the ages of 2 and 12. Preliminary model results show that non-acute (i.e. in the absence of recent applications) exposures to chlorpyrifos are most influenced by the dietary exposure pathway. The youngest age group is shown to have the highest potential exposures. In comparison, predicted acute and short-term (i.e. following recent application) residential exposures and dose from chlorpyrifos residues could be many times greater than the non-acute exposure values, depending on the type of residential pesticide application and the activities of the children. Both the variability and uncertainty in the predicted exposures are found to be very high.
    This work has been funded in part by the United States Environmental Protection Agency. It has been subjected to Agency review and approved for publication.

Zartarian, V. Estimating children's dermal and non-dietary ingestion exposure and dose with EPA's SHEDS model. Presented at: Society for Risk Analysis, Atlanta, GA, December 5-8, 1999.

12/1/1999

Contact: Valerie G. Zartarian morrison

Abstract: A physically-based stochastic model (SHEDS) has been developed to estimate pesticide exposure and dose to children via dermal residue contact and non-dietary ingestion. Time-location-activity data are sampled from national survey results to generate a population of simulated children. For each child, a sequence of 5 second object contact events is generated probabilistically for every location-activity combination, yielding sequential micro-level activity profiles. These profiles are combined with probability distributions for surface concentrations and exposure factors (e.g., pesticide transfer and removal efficiency, skin surface area contacted) to yield daily time profiles for dermal loading, body burden, and eliminated pesticide metabolite. Population estimates are then generated via Monte Carlo sampling. The SHEDS model has been applied for children aged 0-4 and 5-9 years for six chlorpyrifos application scenarios: broadcast and crack and crevice methods; <1 day, 1-7 day, and 8-30 days post-application. Diary data for 1096 children from the National Human Activity Pattern Survey were combined with videotaped activity data and probability distributions for measured concentrations and exposure factors (based on a literature review). For each application scenario and age group, population estimates of daily eliminated 3,5,6-trichloro-2-pyridinol (TCP), the urinary metabolite of chlorpyrifos, were generated. These modeled results are comparable to measured results from EPA's National Human Exposure Assessment Survey and other studies following broadcast and crack and crevice applications of chlorpyrifos.   This work has been funded wholly or in part by the United States Environmental Protection Agency. It has been subjected to Agency review and approved for publication.

Jan 1, 1999 - Dec 31, 1999

Blancato, J.N., Power, F.W., Fisher, J.W., and Scott, C.S. Application and use of dose estimating exposure model (DEEM) for route to route dose comparisons after exposure to trichloroethylene (TCE). Presented at: Annual Meeting of Society of Toxicology, Philadelphia, PA, March 19-23, 2000.

3/19/1999

Contact: Jerry N. Blancato

Abstract: Route-to-route extrapolations are a crucial step in many risk assessments. Often the doses which result In toxicological end points in one route must be compared with doses resulting from typical environmental exposures by another route. In this case we used EPA's Dose Estimating Exposure Model (DEEM) to examine the route comparisons of different measures of internal dose after exposure to TCE. DEEM is a physiologically based model architecture for estimating internal tissue doses resulting from actual or simulated exposures. Because of different kinetic rates in the body not each possible measure of dose has the same quantitative relationship with exposure. Modeling shows that for different choices of internal dose the "equivalent" exposures are different, For example, we first chose the dose of interest to be the area under the curve (AUC) of the metabolite, trichloroacetic acid (TCA). In this case and with this model set-up an 8-hour 30 ppm exposure via inhalation was equivalent to drinking water intake of 50mg per day. For other measures of dose the point of equivalent exposure is far different. Thus, information about the mode of action and selection of internal dose is crucial before route to route extrapolations can be rationally made.   The U.S. Environmental Protection Agency (EPA). through Its Office of Research and Development, funded this research and approved this abstract as a basis for an oral presentation. The actual presentation has not been peer reviewed by the EPA.

Okino, M.S., and Quackenboss, J.J. Dose reconstruction from urinary biomarkers. To be presented at: Biomarkers: Taking Stock EPA/NIEHS Workshop on Applying Biomarker Research, Chapel Hill, NC, August 30-31, 1999.

8/30/1999

Contact: James J. Quackenboss

Abstract: The use of biomarkers for human health risk assessment is attractive because they are an indicator of the dose that actually entered the body by all mechanisms. This is an important consideration given the need to include aggregate exposures from diet and other pathways for pesticides. Quantitative relationships between biomarker and environmental concentrations are often unclear, because what is seen in a urine sample depends on the route and time-profile of the exposure. Pharmacokinetic (PK) models describe the dynamics of the chemical in the body. By inverting the appropriate mathematical expressions, the absorbed dose can be calculated from the concentration of the parent compound or a metabolite in a spot urine sample. The goal of this paper is to review the assumptions used in interpreting urinary biomarkers and highlight the role of PK models in reconstructing dose from spot urine measurements. We will demonstrate the estimation method and the impact of different exposure scenarios on interpretation of the biomarker measurement.   This work has been funded wholly or in part by the United States Environmental Protection Agency. It has been subjected to Agency review and approved for publication.

Okino, M.S., Quackenboss, J.J., and Thomas, K.W. Analysis of uncertainties in dose reconstruction from biomarkers: impact on study design. Presented at: Biomarkers: Taking Stock EPA/NIEHS Workshop on Applying Biomarker Research, Chapel Hill, NC, August 30-31, 1999.

8/30/1999

Contact: James J. Quackenboss

Abstract: The absorbed dose is defined as the quantity which has passed through the barriers (skin, GI tract, The absorbed dose of a pesticide can be estimated from its established urinary biomarker. ungs). For an exposure study, there are several options for biomarker collection, each with advantages and disadvantages in terms of model and scenario uncertainty, subject participation and compliance, and cost. Model uncertainty contains the parameters used for the calculation of dose as well as the ability of the model to simulate the real physical situation. Scenario uncertainty includes the activities of the subject such as other exposures to the target chemical, compliance with measurement protocols, and the timing of the monitored dose. We will demonstrate the effect of scenario and model uncertainties on the dose estimates, and how the uncertainty analysis may be used to guide the design of a study. For an occupational assessment, we will compare the uncertainty associated with collecting spot samples versus total urine collection.   This work has been funded wholly or in part by the United States Environmental Protection Agency. It has been subjected to Agency review and approved for publication

Rigas, M.L., Blancato, J.N., and Power, F.W. Simulation modeling of gastrointestinal absorption. Presented at: Interagency Conference on Toxicology and Risk Assessment, Wright-Patterson AFB, OH, April 12-15, 1999.

4/12/1999

Contact: Jerry N. Blancato

Abstract: Mathematical dosimetry models incorporate mechanistic determinants of chemical disposition in a living organism to describe relationships between exposure concentration and the internal dose needed for PBPK models and human health risk assessment. Because they rely on deterministic physical and chemical properties, dosimetry models can reduce the variability and uncertainty in describing dose and can reduce interspecies uncertainty. The gastrointestinal tract represents a physically complex site of absorption. In the simplest sense, it can be modeled as a plug-flow chemical reactor in which substances move down a tube by convection and material passes through the walls into the bloodstream by diffusion. However, active processes exist to transport ions and other materials from the gastrointestinal lumen into the systemic circulation. Anatomical variations between segments of the tract create different capacities for transport at different locations, and changes in motility affect the residence time in these segments. Longitudinal gradients in pH will cause changes in the aqueous solubility of chemicals and will ultimately affect their absorption. Using a mathematical dosimetry model, we demonstrate how some of these parameters affect the systemic concentrations of compounds such as trichloroethylene (TCE) and chlorothiazide. The U.S. Environmental Protection Agency (EPA), through its Office of Research and Development, funded this research. The abstract has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use

Rigas, M.L., Zartarian, V., Cohen-Hubal, E.A., and Ozkaynak, H. Dermal exposure and dose: using an event-based approach to evaluate measurement approaches. Presented at: Society for Risk Analysis, Atlanta, GA, December 5-8, 1999.

12/5/1999

Contact: Marc L. Rigas

Abstract:

Okino, M.S., and Quackenboss, J.J. Dose reconstruction from urinary biomarkers using pharmacokinetic models. Presented at: American Institute of Chemical Engineers, Dallas, TX, October 31-November 5, 1999.

10/31/1999

Contact: Miles S. Okino

Abstract: The use of biomarkers for human health risk assessment is attractive because they are an indicator of the dose that actually entered the body by all mechanisms. This is an important consideration given the need to include aggregate exposures from diet and other pathways for pesticides. Quantitative relationships between biomarker and environmental concentrations are often unclear, because what is seen in a urine sample depends on the route and time-profile of the exposure.   Urine samples have the advantage of being one of the simplest and least invasive biomarkers to collect for human monitoring, and a wide range of compounds can be detected. The ease of collection is important to consider for human studies to ensure satisfactory response and compliance rates. We have been focusing on the concentrations of a chemical of interest, the parent compound, or its metabolites in urine. The parent compound may be absorbed into the body through a combination of routes: dermal, oral, and respiratory. Absorption, transport, and metabolism are not instantaneous, so there will be a delay before the parent compound or its metabolites are excreted into the urine. A spot urine measurement represents the time-integrated average of the urinary excretion rate over the time period since last urination.   Pharmacokinetic (PK) models describe the dynamics of the chemical in the body. By inverting the appropriate mathematical expressions, the absorbed dose can be calculated from the concentration of the parent compound or a metabolite in a spot urine sample. The use of PK models enables the researcher to obtain a dose estimate while employing less burdensome collection schemes.   The goal of this paper is to review the assumptions used in interpreting urinary biomarkers and highlight the role of PK models in reconstructing dose from spot urine measurements. We will use both simple and physiologically based PK models for some non-persistent pesticides to demonstrate the methods. The appropriate analytical solutions can be obtained directly for simple PK models (1-2 compartments), while model reduction may be necessary for larger physiologically based models. We will demonstrate the effect of scenario and model uncertainties on the dose estimates, and how the uncertainty analysis may be used to guide the design of a study. For an occupational assessment, we will compare the uncertainty associated with collecting spot samples versus total urine collection. We will also discuss the role of biomarker measurements in comprehensive survey studies.   The U.S. Environmental Protection Agency (EPA), through its Office of Research and Development (ORD), funded this research and approved this abstract as a basis for an oral presentation.   The actual presentation has not been peer reviewed by EPA.

Jan 1, 1999 - Dec 31, 1999

Van Emon, J.M. Development and use of immunochemical methods for environmental contaminants at the U.S. EPA, NERL, HERB-LV. Presented at: 113th AOAC International Meeting and Exposition, Houston, TX, September 26-30, 1999.

Contact: Jeanette M. Van emon

Abstract: The HERB-LV has developed several immunoassay methods for environmental and human exposure studies. Immunoassays to detect low levels (<10 ng/mL) chlorpyrifos in track-in dirt and house dust have been developed for indoor exposure surveys. An immunoassay for the urinary metabolite 3,5,6-ttichloro-2pyridinol (TCP) has been optimized and evaluated using real-world samples from monitoring studies. Comparative studies with GC/MS indicate a good correlation with the TCP assay. Antibodies to detect 0,0-diethyl thionates/thionothiolates have been developed and characterized for multiple organophosphorous pesticides (e.g., ethyl parathion, coumaphos, diazinon). Assays are under development for soil, clothing patches and hand rinses. An immunoassay for polychlorinated biphenyls (PCBs) suitable for several soil matrices was developed for hazardous waste site monitoring and evaluated at EPA Superfund sites. Chemically modified electrodes provide a basis for immuno-sensors. Two promising approaches utilize either a conducting polymer or a doped sol-gel that contains the selective antibody. These studies illustrate how immunochemical methods can respond to the needs of various monitoring programs.   The U.S. Environmental Protection Agency (EPA) through its Office of Research and Development (ORD) funded this research and approved this abstract as a basis for an oral presentation. The actual presentation has not been peer reviewed by EPA. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Hern, S.C., and Robertson, G.L. Pesticide exposure and potential health effects in young children along the U.S.-Mexico border. Presented at: Society for Risk Analysis, Atlanta, GA, December 5-8, 1999.

Contact: Stephen C. Hern

Abstract: The purpose of the Pesticides in Young Children - Border States Program is to assess the relationship of health outcomes in children living along the United States and Mexico border to repeated pesticide exposures via multiple sources and pathways. The present research program was designed to determine if a health threat exists and, if so, to identify the major risk factors for intervention. A three phase approach was planned to address program objectives. Phase I as designed to build capacity for subsequent studies by piloting methods and gathering baseline information on the potential for pesticide exposure; Phase II to identify high risk populations of children and potential health effects associated with exposure; and Phase III to describe pesticide exposure risk factors and possibly conduct a full scale study of specific exposures and health outcomes. This approach is integrated, with each subsequent phase building oft the results of earlier efforts. Phase I (1996-1998) began setting the foundation for future studies by reviewing existing pesticide usage and children's health data and creating Geographic Information System (GIS) maps of crops, pesticide application and population density along the border. A workshop was also held to review and evaluate appropriate health endpoints potentially associated with pesticide exposure in young children and to recommend specific study designs. Phase II (1998-2000) has incorporated Phase I information to aid in the design of screening studies to estimate the extent of pesticide exposure in infants and young children living in the border region. Phase III (2000-200?) will include a more extensive monitoring of "high end" exposure children found in Phase II and, if warranted, an epidemiological study to assess the association of pesticide exposure and specific health outcomes.   This work has been funded wholly or in part by the United States Environmental Protection Agency. It has been subjected to Agency review and approved for publication.

Jan 1, 1999 - Dec 31, 1999

Furtaw, Jr., E.J., Dary, C.C., Dellarco, M., and Saint, C.G. An equilibrium-approach model for simulating contaminant transfer between surfaces and skin in support of FQPA. Presented at: Society for Risk Analysis, 1999 Annual Meeting, Atlanta, GA, December 5-8, 1999.

12/1/1999

Contact: Curtis C. Dary

Abstract: The Food Quality Protection Act (FQPA) demands that exposure of infants and children to pesticide residues from non-dietary sources be included in EPA's aggregate risk assessment. Ideally, the informed assessment would aggregate exposures from all reasonable sources, primarily food and drinking water and from dermal contact with surface residues that may result in dermal absorption or nondietary ingestion. To avoid severe overprediction of aggregate exposure, models should conform with the physical and chemical nature of the mechanism of exposure. This is particular important for the process of dermal exposure of infants and children to surface residues. In this regard we have observed that most existing models for simulating contaminant transfer between surfaces and skin are based on the implicit assumption that contaminant transfer is unidirectional, from the surface to the skin. These models do not account for return of residues on the skin back to the surface. The effect of this unrealistic assumption is that during modeled episodes of repeated contact with contaminated surfaces, the dermal loading can continue to increase to unrealistically high levels. To improve the conceptual basis of dermal transfer models, an alternative modeling approach is proposed that accounts for the equilibrium ratio of loadings (mass/area) on surface and skin. Each contact is assumed to provide a given mass fractional approach to equilibrium. Values for model parameters representing the equilibrium loading ratio (RL) and the fractional approach factor (F) can be estimated from available data. It is assumed that appropriate values for RL and F will vary as a function of multiple factors such as the contaminant species and its vehicle, the surface type, contact pressure and duration, and moisture level.   This work has been funded wholly or in part by the United States Environmental Protection Agency. It has been subjected to Agency review and approved for publication.

Lewtas, J., Williams, R.W., Myers, S.R., and Wise, S. Sources of human exposure to airborne PAH. Presented at: 17th International Symposium on Polycyclic Aromatic Compounds, Bordeaux, France, October 25-29, 1999.

10/25/1999

Contact: Joellen lewtas Jungers

Abstract: Personal exposures to airborne particulate polycyclic aromatic hydrocarbons (PAHs) were studied in several populations in the US, Japan, and Czech Republic. Personal exposure monitors, developed for human exposure biomonitoring studies were used to collect fine particles ($<$ 1.7um) on a filter. PAHs were measured in organic extracts of the particles using HPLC/fluorescence and GC/MS. Personal exposure concentrations were measured in ng PAH/m3 air sampled. A wide range of exposure concentrations was measured. For example, personal air concentrations to BaP ranged from <0.05 to 1.97 in Research Triangle Park, NC; from 0.29 to 35.2 in Tokyo, Japan; from 0.30 to 22.0 in Ostrava, CZ; from 0.30 to 5.4 in Teplice, CZ and from 0.20 to 4.0 in Prachatice, CZ. In several of these studies, exposure biomarkers were also measured in blood and urine. Blood samples were analyzed for metabolic genotype, DNA adducts, and trace metals. Urine samples were analyzed for PAH and PAH metabolites. In the Czech Republic, personal exposure concentrations to fine particles and PAH were correlated with excretion of PAH metabolites in urine, several trace metals in blood, and DNA adducts in white blood cells. Indoor exposures to tobacco smoke were controlled by monitoring urinary cotinine and airborne nicotine which were highly correlated. This study examines the PAH profile for the major air pollution emission sources found in the different geographic areas and compares these to the PAH profile for the personal exposures in each study. Where possible, we also examine the use of urinary PAH metabolites to estimate the contribution of specific sources to human exposure to PAH. The major sources of PAH in outdoor air varied across these studies from coal to petroleum combustion products.
This work has been funded in part by the United States Protection Agency and has been subjected to Agency review and approved for publication.

Cupitt, L.T. Human exposure research at EPA's National Exposure Research Laboratory. Presented at: ISEE/ISEA '99 Conference, Athens, Greece, September 5-8, 1999.

9/5/1999

Contact: Larry T. Cupitt

Abstract:

Jan 1, 1999 - Dec 31, 1999

Lewis, C.W. VOC radiocarbon measurements during SCOS97 and emissions inventory validation. Presented at: CARB Biogenic Hydrocarbons Symposium, Sacramento, CA, December 9-10, 1999.

12/9/1999

Contact: Charles W. Lewis

Abstract: Radiocarbon (14C) measurements provide an estimate of the fraction of carbon in a sample that is biogenic. In September 1997 during SCOS97 a series of 3-h canister samples of ambient air were collected at the Azusa air monitoring station during morning and afternoon periods. The fraction of VOC that was biogenic ranged from 0 to 38% for the 10 samples on which 14C measurements were performed, with a mean value of 15 %. GC-FID measurements were also performed on the same samples. The presentation will give details of the results along with a description of the technology involved in the sampling, sample preparation, and 14C analysis (by accelerator mass spectrometry). In addition an example of how similar measurements performed in Atlanta were related to emissions inventories will be given.   This work has been funded wholly or in part by the United States Environmental Protection Agency under Interagency Agreement No. 13937923 to the National Institute of Standards and Technology, and Contract No. 68-D5-0049 to ManTech Environmental Technology, Inc. It has been subjected to Agency review and approved for publication.

Mukerjee, S. Lower Rio Grande Valley transboundary air pollution project (TAPP). Presented at: 1999 Border Environmental Technical Conference, Las Cruces, NM, November 17-19, 1999.

11/17/1999

Contact: Shaibal Mukerjee

Abstract:

Mukerjee, S. Transboundary influences in the lower Rio Grande Valley. Presented at: TAPP Public Meeting, Brownsville, TX, October 27, 1999.

10/27/1999

Contact: Shaibal Mukerjee

Abstract:

Landis, M.S., Stevens, R.K., and Prestbo, E. Manual speciation methods for measuring atmospheric mercury: applications/implementation. Presented at: EPA Workshop on Source and Ambient Air Monitoring of Mercury, Bloomington, MN, September 13-14, 1999.

9/13/1999

Contact: Matthew S. Landis

Abstract:

Arnts, R.R. Evaluation of solid adsorbents for the collection and analyses of ambient biogenic volatile organics. Presented at: American Geophysical Union, San Francisco, CA, December 13-17, 1999.

12/13/1999

Contact: Robert R. Arnts

Abstract: Micrometeorological flux measurements of biogenic volatile organic compounds (BVOCs) usually require that large volumes of air be collected (whole air samples) or focused during the sampling process (cryogenic trapping or gas-solid partitioning on adsorbents) in order to achieve sufficient sensitivity with conventional chromatographic detectors. The technique of relaxed eddy accumulation has emerged as a powerful tool for measuring vertical fluxes of BVOCs. Although relaxed eddy accumulation (REA) theory can be applied using different hardware configurations, the use of solid adsorbents is particularly attractive in meeting the demands of the high speed up and downdraft switching while not subjecting the sample stream to passage through a pump. Tenax-TA (a porous polymer) and Carbotrap (a graphitized carbon black) have become popular to use as solid adsorbents because of their low water retention and high affinity for organics. In order to evaluate their suitability for use in our REA system, we performed intensive laboratory testing of a seven candidate adsorbents (three graphitized carbon blacks, one activated carbon, a porous polymer and two experimental silicone deactivated porous silicas). A challenge mixture of 20 compounds was used to evaluate optimum desorption temperatures, determine breakthrough volumes and recovery using two tubes of each adsorbent connected in series. It was found that at low loadings the recovery coefficients, i. e. b-pinene, linalool (ratio of analyte recovered to analyte loaded) of the carbon adsorbents, although high with the virgin material, decreased dramatically with subsequent reuse. At higher loadings, recovery coefficients of these compounds increased and were reproducible with reuse of the adsorbent. The low recoveries of these analytes at low loadings were accompanied by the appearance of dehydration products and isomerizations. It was also observed that less of the total carbon was recovered at low loadings compared to the higher loadings even when unknown and artifact peaks are included. Interestingly, total recoveries were poorest with the lowest surface area carbons despite breakthrough not occurring. These results are consistent with known activated carbon behavior. The single activated carbon tested (Anasorb 747, SKC Inc.) behaved similarly to the graphitized carbons. However, it collects large quantities of water making it difficult to use without appropriate water management. The porous polymer (Tenax-TA) was much less reactive towards the analyte mix, displaying good recoveries across the range loaded. Slightly lower recoveries of b-pinene and cis3-hexen-l-of were observed at lower loadings with TenaxTA. The silicone deactivated porous silicas demonstrated excellent recoveries of the alcohols without causing the dehydrations observed with the graphitized carbons.   This work has been funded wholly or in part by the United States Environmental Protection Agency (EPA). It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Mukerjee, S., Shadwick, D.S., Dean, K.E., and Carmichael, L.Y. Assessing transboundary influences in the Lower Rio Grande Valley (overheads). Presented at: Air and Waste Management Association Meeting, St. Louis, MO, June 20-24, 1999.

6/20/1999

Contact: Shaibal Mukerjee

Abstract:

Jan 1, 1999 - Dec 31, 1999

JOURNAL

Kleindienst, T.E., Smith, D.F., Li, W., Edney, E.O., Driscoll, D.J., Speer, R.E., and Weathers, W.S. Secondary organic aerosol formation from the oxidation of aromatic hydrocarbons in the presence of dry submicron ammonium sulfate aerosol.   Atmospheric Environment 33 (22):3669-3681 (1999). EPA/600/J-00/228.

9/1/1999

Contact: Daniel J. Driscoll

Abstract: A laboratory study was conducted to examine formation of secondary organic aerosols. A smog chamber system was developed for studying gas-aerosol interactions in a dynamic flow reactor. These experiments were conducted to investigate the fate of gas and aerosol phase compounds generated from hydrocarbon-nitrogen oxide (HC/NOJ mixtures irradiated in the presence of fine (< 2.5 um) particulate matter. The goal was to determine to what extent photochemical oxidation products of aromatic hydrocarbons contribute to secondary organic aerosol formation through uptake on pre-existing inorganic aerosols in the absence of liquid water films. Irradiations were conducted with toluene, p-xylene, and 1,3,5-trimethylbenzene in the presence of N0x and ammonium sulfate aerosol, with propylene added to enhance the production of radicals in the system. The secondary organic aerosol yields were determined by dividing the mass concentration of organic fraction of the aerosol collected on quartz filters by the mass concentration of the aromatic hydrocarbon removed by reaction. The mass concentration of the organic fraction was obtained by multiplying the measured organic carbon concentration by 2.0, a correction factor that takes into account the presence of hydrogen, nitrogen, and oxygen atoms in the organic species. The mass concentrations of ammonium, nitrate, and sulfate concentrations as well as the total mass of the aerosols were measured. A reasonable mass balance was found for each of the aerosols. The largest secondary organic aerosol yield of 1.59 ? 0.40% was found for toluene at an organic aerosol concentration of 8.2 um-3, followed by 1.09 ? 0.27% for p-xylene at 6.4 ug m-3, and 0.41 ? 0.10% for 1,3,5-trimethylbenzene at 2.0 ug m-3. In general, these results agree with those reported by Odum et al. and appear to be consistent with the gas-aerosol partitioning theory developed by Pankow. The presence of organic in the aerosol did not affect significantly the hygroscopic properties of the aerosol.   The reserach described in this paper has been funded wholely by the US Environmental Protection Agency under Contract 68-D5-0049 to ManTech Environmental Technology, Inc. It has not been subject to Agency review. Mention of trade names or commercial products does not constitute endorsement or recommended use.

Lewis, R.G., Fortune, C.R., Willis, R.D., Camann, D.E., and Utley, J.T. Distribution of pesticides and polycyclic aromatic hydrocarbons in house dust as a function of particle size. Environmental Health Perspectives 107 (9):721-726 (1999). EPA/600/J-99/237.

9/1/1999

Contact: Robert G. Lewis

Abstract: House dust is a repository for environmental pollutants that may accumulate indoors from both internal and external sources over long periods of time. Dust and tracked-in soil accumulate most efficiently in carpets, and the pollutants associated with it may present an exposure risk to infants and toddlers, who spend significant portions of their time in contact with or in close proximity to the floor and engage in frequent mouthing activities. The availability of carpet dust for exposure by transfer to the skin or by suspension into the air depends on particle size. In this study, a large sample of residential house dust was obtained from a commercial cleaning service whose clients were homeowners residing in the Research Triangle area of North Carolina. The composite dust was separated into seven size fractions ranging from <4 ?m to 500 ?m in diameter, and each fraction was analyzed for 28 pesticides and 10 polycyclic aromatic hydrocarbons (PAHs). Over 20% of the fractionated dust sample consisted of particles less than 25 ?m in diameter. Fourteen pesticides and all 10 of the target PAHs were detected in one or more of the seven size-fractionated samples. Sample concentrations reported range from 0.02 to 22 ?g/g, with the synthetic pyrethroids cis- and trans-permethrin being the most abundant pesticide residue. The concentrations of nearly all of the target analytes were found to increase gradually with decreasing particle size for the larger particles, then dramatically for the two smallest particle sizes (<25 ?m and <4 um).
   The U.S. Environmental Protection Agency through its Office of Research and Development funded, managed, and collaborated in the research described here under contract 68-D5-0049 to ManTech Environmental Technology, Inc. and contract 68-D5-0040 to the Research Triangle Institute. It has been subject to agency review and approved for publication.

Jan 1, 1999 - Dec 31, 1999

Nishioka, M., Burkholder, H.M., and Brinkman, M.C. Distribution of 2,4-Dichlorophenoxyacetic acid in floor dust throughout homes following homeowner and commerical lawn applications: quantitative effects of children, pets, and shoes.   Environmental Science & Technology 33 (9):1359-1365 (1999). EPA/600/J-01/064.

5/1/1999

Contact: Robert G. Lewis

Abstract: Transport of lawn-applied 2,4-D into 13 actual homes was measured following both homeowner and commercial application of this herbicide to residential lawns. Collection of floor dust in five rooms of each house, corresponding to an entryway, living room, dining room, kitchen, and a child's bedroom, both prior to and after application, indicated that turf residues are transported indoors and that the gradient in 2,4-D dust loading (ug/m2) through the house follows the traffic pattern from the entryway. Removal of shoes at the door and the activity level of the children and pets were the most significant factors affecting residue levels indoors after application. Spray drift and fine particle intrusion accounted for relatively little of the residues onfloors. Prior to application, the median 2,4-D bulk floor dust loading was 0.5 ug/m2; one week after application, the median 2,4-D floor dust level in the living room was 6 ug/m2, with a range of 1-228 ug/m2 on all carpeted floors in occupied homes, and 0.5-2 ug/m2 in unoccupied homes. The 2,4-D loadings on the carpet surface (dislodgeable residue/dust) were highly correlated with the 2,4-D bulk dust loadings. From these data we estimate that approximately 1% of the bulk dust is on the carpet surface, and it is this surface dust that may be readily available for dermal contact.   The information in this paper has been wholly funded by the U.S. Environmental Protection Agency under Cooperative Agreement CR-822082 to Battelle. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Liu, S., and Pleil, J.D. Method of liquid-liquid extraction of blood surrogates for assessing human exposure to jet fuel.   Journal of Chemical and Engineering Data 728 (2):193-207 (1999). EPA/600/J-99/185.

5/28/1999

Contact: Joachim D. Pleil

Abstract: A baseline method of liquid?liquid extraction for assessing human exposure to JP-8 jet fuel was established by extracting several representative compounds ranging from very volatile to semi-volatile organic compounds, including benzene, toluene, nonane, decane, undecane, tridecane, tetradecane and pentadecane, from PBS buffer. Some specific techniques for solvent selection, solvent evaporation, and GC analysis were developed to accommodate this wide range of constituents of JP-8. The application of the established method to the extraction and quantitative analysis of JP-8 from PBS and bovine plasma was demonstrated.   This work was funded by the National Exposure Research Laboratory, U.S. Environmental Protection Agency, through Contract 68-D5-0049 with ManTech Environmental Technology, Inc. Mention of trade names or commercial products does not consittute endorsement or recommendation for use.

Wilson, N.K., Chuang, J.C., and Lyu, C. Multimedia concentrations of PAH in several day care centers.   Polycyclic Aromatic Compounds 17 (3):255-265 (1999). EPA/600/J-00/105, Available: 68-D4-0023.

12/31/1999

Contact: Nancy K. Wilson

Abstract: Concentrations of polycyclic aromatic hydrocarbons were measured in nine day care centers in the spring of 1997. Indoor and outdoor air, food and beverages, indoor dust, and outdoor play area soil were sampled. The mean sums of 20 target PAH concentrations were 265 and 199 ng/m3 in indoor and outdoor air, respectively; 3.48 ppm in classroom dust; 1.56 ppm in playground soil; 4.33 ppb in solid food; and 1.38 ppb in liquid food. Large differences in PAH concentrations between the centers were observed only for play area soil, where the mean concentrations at the centers serving primarily low-income clients were as much as 42 times higher than those at the other centers. Potential exposures through the inhalation and ingestion pathways were calculated. The ingestion pathway was most important, especially for the larger 4-7 ring PAH.   The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under Contract 68-D4-0023 to Battelle. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Lindstrom, A.B., Yeowell-O'Connell, K., Waidyanatha, S., McDonald, T.A., and Rappaport, S.M. Investigation of benzene oxide in bone marrow and other tissues of F344 rats following metabolism of benzene in vitro and in vivo.   Chemico-Biological Interactions 122 (1):41-58 (1999). EPA/600/J-99/281.

Contact: Andrew B. Lindstrom

Abstract: This study examines the initial activation of benzene, exploring key aspects of its metabolism by measurement of benzene oxide (BO) and BO-protein adducts in vitro and in vivo. To assess the potential influence of various factors on the production of BO, microsomes were prepared from tissues that were either targets of benzene toxicity, i.e. the bone marrow and Zymbal glands, or not targets, i.e. liver and kidneys, of control and acetone-treated F344 rats. No BO or phenol was detected in microsomal preparations of bone marrow or Zymbal glands (less than 0.007 nmol BOmg protein and 0.7 nmol phenol mg protein). On the other hand. BO and phenol were readily detected in preparations of liver and kidney microsomes and acetone pretreatment resulted in a 2-fold (kidney) increase or 3.7-fold (liver) increase in production of these metabolites. Initial rates of BO production in the liver isolates were 30 (control) to 50 (acetone-treated) times higher than in the corresponding kidney tissues. The estimated half-life of BO in bone marrow homogenates was 6.0 min and the second-order reaction rate constant was estimated to be $1.35 \times 10\text{-}3$ 1 (g bone marrow)-1 (h)-1. These kinetic constants were used with measurements of BO-bone marrow adducts in F344 rats, receiving a single gavage dosage of 50-400 mg benzene (kg body weight)-1(McDonald, T.M., et al. (1994), Cancer Res. 54, 4907-4914), to predict the bone marrow dose of BO. Among the rats receiving 400 mg (kg body weight)-1, a BO dose of 1.13×103 nM BO-h was estimated for the bone marrow, or roughly 40% of the corresponding blood dose predicted from BO-albumin adducts. Together these data suggest that, although BO is not produced at detectable levels in the bone marrow or Zymbal glands of F344 rats, BO is rapidly distributed via the bloodstream to these tissues where it may play a role in toxicity.   This work was supported by the National Institute of Environmental Health Sciences through grant P42ES05948. The information in this document has been funded in part by the United States Environmental Protection Agency. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Chuang, J.C., Wilson, N.K., and Lewis, R.G. Methodology of ambient air monitoring for polycyclic aromatic hydrocarbons.   Fresenius Environmental Bulletin 8 (9-10):547-556 (1999). EPA/600/J-99/285.

Contact: Nancy K. Wilson

Abstract: In the last decade, several studies of polycyclic aromatic hydrocarbons (PAH) in ambient air in the U.S. specifically investigated (1) the sampling efficiency of two sorbents for PAH in air: XAD-2 and polyurethane foam (PUP); (2) the storage stability of PAH on quartz fiber filters and the sorbents; (3) the phase distribution of ambient PAH; and (4) total PAH concentrations (in both vapor and particulate phases) in ambient air. This paper summarizes their findings.
     The U.S. Environmental Protection Agency through its Office of Research and Development partially funded and managed the research described here under Contract 68-D4-0023 to Battelle. It has been subjected to Agency review and approved for publication.

Walker, K.R., Vallero, D.A., and Lewis, R.G. Factors influencing the distribution of lindane and other hexachlorocyclohexanes in the environment.   Environmental Science & Technology 23 (4):4373-4378 (1999). EPA/600/J-01/055.

Contact: Daniel A. Vallero

Abstract: This review examines the potential for y-hexachlorocycio-hexane (HCH) to be transformed into other isomers of HCH. HCH residues are among the most widely distributed and frequently detected organochlorine contaminants in the environment. The potential environmental and human health risks associated with these residues have prompted Canada, the United States, and Mexico to consider the development of a North American Regional Action Plan (NARAP) to assess and mitigate HCH pollution. More information on the propensity of y-HCH to transform into other isomers is essential to the development of an effective regional management program. The high relative concentrations of a-HCH in the Arctic suggest that y-HCH may be transformed into other isomers in the environment. Laboratory studies show that significant photoisomerization of y-HCH to a-HCH is possible. However, field studies do not find evidence for significant isomerization of y-HCH, and recent environmental samples suggest that a-HCH residues are declining asthe use of technical HCH has ended in most parts of the world. Alternative explanations for the patterns of isomer contamination are discussed.   This manuscript has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for publication. Mention of trade names or commercial products does not constitute an endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

McCurdy, T.R., Zelenka, M.P., Lawrence, P., Houston, R.M., and Burton, R.M. Acid aerosols in the Pittsburgh metropolitan area. Published in: Atmospheric Environment 33:5133-5145 (1999).

<div align="right">12/31/1999</div>

Contact: Thomas R. Mccurdy

Abstract:

Wilson, N.K., Chuang, J.C., Lyu, C., and Callahan, P.J. Polycyclic Aromatic Hydrocarbon Exposures of Children in Low-Income Families. Journal of Exposure Analysis and Environmental Epidemiology 9 (2):85-98 (1999).

<div align="right">1/1/1999</div>

Contact: Nancy K. Wilson

Abstract:

Rogers, K.R., and Gerlach, C.L. An update on environmental biosensors.   Environmental Science & Technology 33 (23):500A-506A (1999). EPA/600/J-02/221.

<div align="right">12/1/1999</div>

Contact: Kim R. Rogers

Abstract:

Rogers, K.R., Apostol, A.B., Madsen, S.J., and Spencer, C.W. Detection of low dose radiation induced DNA damage using temperature differenntial fluoresence assay.   Analytical Chemistry 71 (19):4423-4426 (1999).

<div align="right">10/1/1999</div>

Contact: Kim R. Rogers

Abstract:

Rourke, M.K., Rogan, S., Jin, S., and Robertson, G.L. Spatial distributions of arsenic exposure and mining communities from NHEXAS Arizona.   Journal of Exposure Analysis and Environmental Epidemiology 9 (5):446-455 (1999). EPA/600/J-99/296.

<div align="right">10/1/1999</div>

Contact: Gary L. Robertson

Abstract: Within the context of the National Human Exposure Assessment Survey (NHEXAS), metals were evaluated in the air, soil, dust, water, food, beverages, and urine of a single respondent. Potential doses were calculated for five metals including arsenic. In this paper, we seek to validate the potential dose calculations through spatial analysis of the data. Others report elevated arsenic concentrations in biological and environmental samples from residents of mining towns, particularly Ajo, Arizona. These reports led us to expect potential arsenic doses above the 90th percentile of the NHEXAS exposure distribution to be from residents of mining communities. Arsenic dose was calculated using media concentrations, time activity patterns, and published exposure factors. Of the 179 homes evaluated, 54 were in mining communities; 11 of these were considered separately for reasons of population bias. Of the 17 homes with the greatest potential arsenic doses, almost half (47%) were in mining communities. We evaluated the potential doses by media from nonmining and mining areas using the nonparametric Mann-Whitney U test. Statistically significant (p=0.05) differences were found between mining (n=43) and nonmining sites (n=122) for total exposure and for each of the following media: house dust, yard soil, outdoor air, beverage consumed, and water consumed. No differences were found in either food or indoor air of mining and nonmining areas. We eliminated outliers and repeated the test for all media; significance increased. Dietary, organic arsenic from fish consumption contributed to elevated arsenic exposure among people from nonmining communities and acted as an initial confounder. When controlling for fish consumption, we were able to validate our potential dose model using arsenic, particularly in Ajo. Further, we identified three mining communities lacking elevated arsenic exposure. Additional work is needed speciating the arsenic and evaluating health risks. The utilization of Geographic Information System facilitated spatial this project and paves the way for more sophisticated future spatial analyses.   The information in this document has been funded wholly or in part by the United States EPA under Cooperative Agreement CR 821560 to The University of Arizona. It has been subjected to Agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Chuang, J.C., Pollard, M.A., Misita, M., and Van Emon, J.M. Evaluation of analytical methods for determining pesticides in baby food.   Analytica Chimica Acta 399 (1-2):135-142 (1999). EPA/600/J-00/140, Available: 68-D4-0023 Battelle.

Contact: Jeanette M. Van emon

Abstract: Three extraction methods and two detection techniques for determining pesticides in baby food were evaluated. The extraction techniques examined were supercritical fluid extraction (SFE), enhanced solvent extraction (ESE), and solid phase extraction (SPE). The detection techniques used were enzyme-linked immunosorbent assay (ELISA) and gas chromatography/mass spectrometry (GC/MS). Different SFE and ESE conditions were considered, and the resulting extracts were analyzed by either ELISA or GC/MS. The use of C18 SPE cartridges to extract pesticides from baby food were also evaluated. Using SFE-ELISA, recoveries of most spiked pesticides were less than 50% in both non-fat and fatty baby food. using SFE-GC/MS, recoveries of target pesticides were greater than 80% in dried baby food, but 10-60% of the spiked pesticides were lost during the freeze-drying process. Off-line coupling of SPE-GC/MS provided a quantitative measure (>80%) of the pesticides in non-fat baby food (fruits and vegetables). Direct ELISA applied to diluted non-fat food also gave a quantitative measure of the target pesticides. The ESE-ELISA method provided a quantitative determination of atrazine in both non-fat and fatty baby food.   This work was supported by US EPA Contract No. 68-D4-0023 to Battelle Memorial Institute. It has been subjected to the Agency's peer and administrative review and has been approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

11/1/1999

Rogers, K.R., Apostol, A.B., Madsen, S.J., and Spencer, C.W. Detection of low dose radiation induced DNA damage using temperature differential fluorescence assay.   Analytical Chemistry 71 (19):4423-4426 (1999). EPA/600/J-99/278.

Contact: Kim R. Rogers

Abstract: A rapid and sensitive fluorescence assay for radiation-induced DNA damage is reported. Changes in temperature-induced strand separation in both calf thymus DNA and plasmid DNA (puc 19 plasmid from Escherichia coli) were measured after exposure to low doses of radiation. Exposures of between 0.004 and 1 Gy were measured with doses as low as 0.008 Gy yielding significant responses. The double-strand, sensitive dye PicoGreen was used as an indicator of DNA denaturation. Calibration plots indicate that fluorescence changes corresponding to amounts as low as 1 ng of double stranded DNA (10(6) copies for plasmid puc 19) are detected by this method.   The U.S. Environmental Protection Agency, through its Office of Research and Development (ORD), funded this research through a competitive internal grant (to K.R.). It has been subject to the EPA's peer and administrative review and has been approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation by EPA for use.

10/19/1999

Robertson, G.L., Lebowitz, M.D., O'Rourke, M.K., Gordon, S.M., and Moschandreas, D.J. The National Human Exposure Assessment Survey (NHEXAS) study in Arizona-introduction and preliminary results.   Journal of Exposure Analysis and Environmental Epidemiology 9 (5):427-434 (1999). EPA/600/J-99/285.

Contact: Gary L. Robertson

Abstract: The objective of the National Human Exposure Assessment Survey (NHEXAS) in Arizona is to determine the multimedia distribution of total human exposure to environmental pollutants in the classes of metals, pesticides, and volatile organic compounds (VOCs) for the population of Arizona. This was accomplished by studying a probability-based sample of the total population in Arizona with a nested design for the different stages of sampling (954 Stage I, 505 Stage II, and 179 Stage III participants). This report compares the study population demographics with those from the U.S. Census and provides preliminary data on the distributions of the example pollutant for each class, lead for metals, chlorpyrifos for pesticides, and benzene for metals. The probability-based sample age and gender demographics compare reasonably well with the Census data (1990 Census and 1996 Census Estimate). The race/ethnicity compared less well with 21% Hispanics in the 1996 Census Estimate and 42% Hispanics in the entire NHEXAS-Arizona sample and 30% Hispanics as Stage III participants for this study. The chemical analyses of the various media (yard soil, foundation soil, house dust, indoor air, outdoor air, drinking water, food, and beverage) show generally low levels of the representative pollutants. The 50th percentiles of the distributions are generally near or below the analytical detection limits, and applicable Federal action limits were rarely exceeded.   Preparation of this document has been funded wholly or in part by the U.S. Environmental Protection Agency under cooperative agreement CR821560 to the University of Arizona. It has been subjected to agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

10/1/1999

Presented Published

Rogers, K.R., Wang, Y., Mulchandani, A., Mulchandani, P., and Chen, W. Organophosphorus hydrolase-based assay for organophosphate pesticides.   Biotechnology Progress 15 (3):517-521 (1999). EPA/600/J-00/296.

6/1/1999

Contact: Kim R. Rogers

Abstract: We report a rapid and versatile Organophosphorus hydrolase (OPH)-based method for measurement of organophosphates. This assay is based on a substrate-dependent change in pH at the local vicinity of the enzyme. The pH change is monitored using fluorescein isothiocyanate (FITC), which is covalently Immobilized to the enzyme. This method employs the use of poly(methyl methacrylate) beads to which the FITC-labeled enzyme is adsorbed. Analytes were then measured using a microbead fluorescence analyzer. The dynamic concentration range for the assay extends from 25 to 400 uM for paraoxon with a detection limit of 8 uM. Organophosphorus insecticides measured using this technique included ethylparathion, methylparathion, dursban, fensulfothion, crotoxyphos, diazinon, mevinphos, dichlorvos, and coumaphos. This technique was used to measure coumaphos in biodegradation samples of cattle dip wastes and showed a high correlation (r2 = 0.998) to an HPLC method.
    The U.S. Environmental Protection Agency (EPA), through its Office of Research and Development (ORD), funded the work involved in preparing this article. It has been subject to the Agency's peer review and has been approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation by the U.S. EPA. This work was supported, in part, by EPA Grant R823663-01-0 (to A.M. through UCR).

Rogers, K.R., Becker, J., Wang, J., and Lu, F. Determination of phenols in environmentally relevant matrices with the use of liquid chromatography with an enzyme electrode detector. Field Analytical Chemistry and Technology 3 (3):161-169 (1999). EPA/600/J-02/218.

3/18/1999

Contact: Kim R. Rogers

Abstract: A simple and rapid assay using HPLC with a tyrosinase-containing carbon paste electrode (Tyr-CPE) detector is demonstrated for the detection of phenol, p-cresol, p-methoxyphenol, and p-chlorophenol in environmental matrices. These compounds were measured in contaminated aqueous soil leachate samples or ace-tone/acetonitrile extracts of soil and sludge samples. The dynamic range for this assay was 2-30 ppm for phenol and p-cresol. In addition to analysis by the Tyr-CPE detector held at a reducing potential (-0.20 V), soil leachate and extracts were analyzed with the use of a carbon paste electrode (CPE) detector at oxidizing potentials (+1.0 V or +1.2 V). Compared to the CPE, the Tyr-CPE detector was very stable, showing a signal loss of only 28% over 24 h of continuous operation. In addition, the signal from the CPE degraded rapidly by 65% over 10 sequential injections, whereas the signal of the Tyr-CPE decreased by only 5% for the same number of sequential injections. Because of the minimal sample preparation for analysis of soil leachate samples, the herein-reported chromatographic system with biosensor detector could be further developed to complement portable tyrosinase enzyme electrode biosensors that detect total phenols in field settings.   The U.S. Environmental Protection Agency (EPA), through its Office of Research and Development (ORD), partially funded the work involved in preparing this article. It has been subjected to the EPA's peer and administrative review and has been approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation by EPA for use.

Thomas, D.H., Rakestraw, D.J., Schoeniger, J.S., Lopez-Avila, V., and Van Emon, J.M. Selective trace enrichment by immunoaffinity capillary electrochromatography on-line with capillary zone electrophoresis - laser-induced fluorescence. Published in: Electrophoresis 20:57-66 (1999).

12/31/1999

Contact: Jeanette M. Van emon

Abstract: Limited by the lack of a sensitive, universal detector, many capillary-based liquid-phase separation techniques might benefit from techniques that overcome modest concentration sensitivity by preconcentrating large injection volumes. The work presented employs selective solid-phase extraction by immunoaffinity capillary electrochromatography (ACEC) to enhance detection limits. A model analyte, fluorescein isothiocyanate (FITC) biotin, is electrokinetically applied to a capillary column packed with an immobilized anti-biotin-IgG support. After selective extraction by the immunoaffinity capillary, the bound analyte is eluted, migrates by capillary zone electrophoresis (CZE), and is detected by laser-induced fluorescence. The column is regenerated and reused many times. We evaluate the performance of IACEC for selective trace enrichment of analytes prior to CZE. The calibration curve for FITC-biotin bound versus application time is linear from 10 to 300 seconds. Recovery of FITC-biotin spiked into a diluted urinary metabolites solution was 89.4% versus spiked buffer, with a precision of 1.8% relative standard deviation (RSD).

Jan 1, 1999 - Dec 31, 1999

Clayton, C.A., Pellizzari, E.D., Whitmore, R.W., Perritt, R.L., and Quackenboss, J.J. National Human Exposure Assessment Survey (NHEXAS): distributions and associations of lead, arsenic and volatile organic compounds in EPA Region 5. Published in: Journal of Exposure Analysis and Environmental Epidemiology 9:381-392 (1999).

12/31/1999

Contact: Stephen C. Hern

Abstract:

Whitmore, R., Byron, M.Z., Clayton, C.A., Thomas, K.W., Zelon, H.S., Pellizzari, E.D., Lioy, P.J., and Quackenboss, J. Sampling design response rates, and analysis weights for the National Human Exposure Assessment Survey (NHEXAS) in EPA Region 5. Published in: Journal of Exposure Analysis and Environmental Epidemiology 9:369-380 (1999).

1/1/1999

Contact: Stephen C. Hern

Abstract:

Mukerjee, S., Shadwick, D.S., Bowser, J.J., and Carmichael, L.Y. Application of a dual fine particle sequential sampler, a tapered element oscillating microbalance, and other air monitoring methods to assess transboundary influence of PM 2.5.   Field Analytical Chemistry and Technology 3 (3):201-217 (1999). EPA/600/J-02/220.

8/12/1999

Contact: Shaibal Mukerjee

Abstract: Transboundary influences of paniculate matter less than or equal to 2.5 um in aerodynamic diameter (PM2.5,) have been investigated in a U.S.-Mexican border region using a dual fine particle sequential sampler (DFPSS) and tapered element oscillating microbalance (TEOM). Daily measurements of PM2.5 were conducted with the DFPSS. Short-term variations in the concentration of PM2.5 were measured and analyzed on-site using a tapered element oscillating microbalance (TEOM?) to assess episodic emissions that may have crossed the border. Fine particle carbon measurements using a dichotomous sampler and meteorological measurements were also performed. Ambient monitoring with these sampling methods was conducted for one year at three fixed sites very close to the border of the Lower Rio Grande Valley. Element tracer analyses and wind sector analyses were performed to assess transboundary influences. Ad hoc sampler comparisons were also presented. Presentation of advantages and limitations of sampling methods in this study can help establish a baseline for assessing future air quality conditions of a transboundary nature in the Valley.   The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under Contract No. 68-D2-0134 to QST Environmental, Inc. and Contract No. 58-D5-0049 to ManTech Environmental, Inc. This article has been subjected to agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Lewis, C.W., Stevens, R.K., Rasmussen, R.A., Cardelino, C., and Pierce, Jr., T.E. Biogenic Fraction of Ambient VOC: Comparison of Radiocarbon, Chromatographic, and Emissions Inventory Estimates for Atlanta GA.   Journal of the Air & Waste Management Association 49:299-307 (1999).

3/1/1999

Contact: Charles W. Lewis

Abstract:

Rhoads, G.G., Ettinger, A.S., Weisel, C.P., Buckley, T., Goldman, K.D., Adgate, J.L., and Lioy, P.J.   The Effect of Dust Lead Control on Blood Lead in Toddlers: A Randomized Trial.   Pediatrics 103 (3):551-555 (1999). EPA/600/J-02/219.

3/1/1999

Contact: Timothy J. Buckley

Abstract:

Luecken, D.J., Tonnesen, G.S., and Sickles, II, J.E. Differences in NOy speciation predicted by three photochemical mechanisms. Atmospheric Environment 33:1073-1084 (1999).

2/1/1999

Contact: Deborah J. Luecken

Abstract:

PROJ RPT/SUM

McClenny, W.A. Description and Testing of the AnalTech Model 9801P Monitor for Formaldehyde in Air.   1999. EPA/600/R-98/139 (NTIS PB99-118291).

                      1/21/1999

Contact: William A. Mcclenny

Abstract:

Steger, J.L., Bursey, J.T., and Merrill, R.G. Research and Development of A Field-Ready Protocol for Sampling of Phosgene from Stationary Source Emissions, EPA/600/R-99/015 (NTIS PB99-132060). U.S. Environmental Protection Agency.

                      3/30/1999

Contact: Easter A. Coppedge

Abstract:

PUB REPORT

Willis, R.D., and Ellenson, W.D. Fort Hall source apportionment study (final report).   1999. EPA/600/R-99/103 (NTIS PB2001-100329).

                      10/13/1999

Contact: Teri L. Conner

Abstract: Air quality monitoring on the Fort Hall Indian Reservation has revealed numerous exceedances of the National Ambient Air Quality Standard (NAAQS) for 24-h averaged PM10 mass. Wind-directional analysis coupled with PM10 measurements have identified the FMC elemental phosphorus plant as the major source of PM10. This study attempts to identify specific sources or operations within the FMC complex that contribute to the PM10 violations. Data used to identify FMC emission sources were collected at two downwind and one background monitoring sites and include 24-h PM10 concentrations, met data (wind speed and wind direction), 24-h PM2.5 and coarse (PM10 minus PM2.5) mass and elemental concentrations, organic and elemental carbon data on selected ambient samples, continuous PM10 and PM2.5 measurements, and electron microscopy characterization of individual source and ambient particles. A limited source sampling effort was conducted, which yielded qualitative source profiles of selected FMC sources or processes. Ambient data show that PM10 is dominated by the fine fraction (PM2.5) but that both fine and coarse-fraction aerosols are generally required to produce an exceedance. PM10 mass during exceedance events is split approximately evenly (with significant mass unaccounted for) between fine-fraction phosphate, believed to be emitted predominantly from the ground and elevated CO flares, and coarse-fraction Ca and Si-rich dust believed to come from numerous sources at FMC. Short but intense "miniflush" events appear to be less important than steady-state CO flaring as it relates to 24-h averaged PM10. Ambient and source concentrations of thallium and rubidium are used to estimate upper limits on contributions from the calciners (<9% of the total fine mass) and furnace tapping (<9% of fine mass), respectively. In addition to extremely high P concentrations, unusually high concentrations of anthropogenic elements Se, Cd, V, Cr, Ni, Hg, and Tl were measured at the downwind monitoring sites when winds are from FMC. Efforts to provide more definitive source apportionment results are limited, especially for the coarse fraction, by the lack of quantitative and representative source profiles.   The U.S. Environmental Protection Agency through its Office of Research and Development managed and partially funded the research described here under Contract 68-D5-0049 to ManTech Environmental Technology, Inc. Principal funding was provided by Region 10 of the U.S. Environmental Protection Agency through Work Assignments III-072 and IV-107. This document has been submitted for Agency peer and administrative review and approved for publication as an EPA document. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Steger, J.L., Merrill, R.G., Parrish, C.R., and Johnson, L.D. Development and Evaluation of A Source Sampling Method for Hydrogen Cyanide.   1999. EPA/600/R-99/014 (NTIS PB99-132193).

                      5/10/1999

Contact: Robert G. Fuerst

Abstract:

Jan 1, 1999 - Dec 31, 1999

Nishioka, M., Burkholder, H.M., Brinkman, M.C., and Hines, C. Transport of lawn-applied 2,4-D from turf to home: assessing the relative importance of transport mechanisms and exposure pathways.   1999. EPA/600/R-99/040 (NTIS PB99-156358).

6/28/1999

Contact: Robert G. Lewis

Abstract: Transport of 2,4-D from the residential lawn into the home was measured following both homeowner and commercial application of this herbicide. Collection of floor dust in five rooms of each house, both prior to and after application, indicated that turf residues are transported indoors and that the gradient in 2,4-D surface loading (ug/m2) through the house follows the traffic pattern from the entry. Removal of shoes at the door, and the activity level of the children and pets, were the most significant factors affecting residue levels indoors after application. Spray drift and fine particle intrusion accounted for relatively little of the residues on floors. Prior to application, 2,4-D floor dust surface loadings were approximately 0.1 to 5 ug/m2; one week after application, these levels were 1-228 ug/m2 on carpeted floors in occupied homes, and 0.5 to 2 ug/m2 in unoccupied homes. Dislodgeable carpet surface residues of 2,4-D were highly correlated with 2,4-D dust levels, and indicated that approximately 1% of the dust is readily available for dermal contact. Tabletop levels of 2,4-D were approximately 10% of carpet loadings, and were largely due to in-home dust resuspension.   Non-dietary ingestion of carpet dust and inhalation for a 1-yr old child in these homes may produce exposures of 0.04-7 ug/day. These exposure estimates would be substantially higher, 4-70 ug/day, if the non-dietary ingestion was based on contact and transfer from hard surfaces such as contaminated table tops. In limited cases, these hypothetical exposures would approach the U.S. EPA IRIS RfD limits for 2,4-D of 10 ug/kg/day.

McGaughey, J.F., Bursey, J.T., Dayton, D.P., Blackard, A., and Harrison, D. Automated Stationary Source Dynamic Spiking.   1999. EPA/600/R-98/140 (NTIS PB99-118341).

1/29/1999

Contact: Frank W. Wilshire

Abstract:

Glenn, G., and Shadwick, D.S. Analysis of carbon monoxide exposure for fourteen cities using HAPEM-MS3 (final technical report).   1999. EPA/600/R-99/096 (NTIS PB2000-101197).

9/27/1999

Contact: Thomas R. Mccurdy

Abstract: This report describes results and findings of applying the Hazardous Air Pollutant Exposure Model (HAPEM) for mobile sources, Version 3. This version is formally known as HAPEM-MS3. The application is to fourteen urban areas for calendar year 1990. The urban areas modeled include Baltimore, Boston, Chicago, Denver, Houston, Los Angeles, Minneapolis, New York City, Philadelphia, Phoenix, San Francisco, Spokane, St. Louis, and Washington DC. The report contains a description of the HAPEM-MS3 model, model results and a discussion of their implications, an uncertainty assessment, and a description of quality control measures undertaken during conduct of the study. Appendices contain detailed tables of model results of all 14 areas and a map of each area. Principle results are urban-area specific tables containing human exposure estimates to ambient carbon monoxide sources disaggregated by demographic groups, calendar quarter of the year, and by county within an urban area. Other tables are presented that focus on summary statistics for)pulation exposure estimates by hour, air district, and microenvironment where the exposure people are located. Percentile and fractile estimates of population exposure are also presented for selected population cohorts.

   This report presents the results of work performed by ManTech Environmental Technology, Inc., under Work Assignment II-48 of Contract 68-D5-0049 for the National Exposure Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC. This report has been reviewed by ManTech Environmental Technology, Inc., and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Cohen-Hubal, E.A., Thomas, K.W., Quackenboss, J.J., Furtaw, Jr., E.J., and Sheldon, L.S. Dermal and Non-Dietary Exposure Workshop.   1999. EPA/600/R-99/039 (NTIS PB99-150922).

6/1/1999

Contact: Elaine A. Cohen-hubal

Abstract: A dermal and non-dietary ingestion exposure workshop was sponsored by U.S. EPA's National Exposure Research Laboratory (NERL) on September 17,1998. The purpose of this workshop was to gather information on the state-of-the-art in measuring and assessing children's exposures to pesticides via dermal contact with contaminated surfaces and objects as well as by non-dietary ingestion. Although the NERL human exposure research program covers exposure from source to dose, this workshop focused on characterizing concentrations of pesticides in the exposure media (on surface/object) and on quantifying the transfer of contaminants to the skin surface or mouth. The following report discusses the focus of the dermal exposure workshop, summarizes the workshop discussions and identifies research priorities based on a review of the literature, workshop discussions, and expert input.

Chuang, J.C., Lyu, C., Chou, Y-L, Callahan, P.J., Nishioka, M., Andrews, K., Pollard, M., Brackney, L., Hines, C., Davis, D.B., and Menton, R.B. Evaluation and Application of Methods for Estimating Children's Exposure to Persistent Organic Pollutants in Multiple Media Vol. III: Appendices D-T.   1999. EPA/600/R-98/164c (NTIS PB99-134959).

2/23/1999

Contact: Nancy K. Wilson

Abstract:

Chuang, J.C., Lyu, C., Chou, Y-L, Callahan, P.J., Nishioka, M., Andrews, K., Pollard, M., Brackney, L., Hines, C., Davis, D.B., and Menton, R.B. Evaluation and Application of Methods for Estimating Children's Exposure to Persistent Organic Pollutants in Multiple Media Vol. II: Appendices A-C.   1999. EPA/600/R-98/164b (NTIS PB99-134942).

2/23/1999

Contact: Nancy K. Wilson

Abstract:

Chuang, J.C., Lyu, C., Chou, Y-L, Callahan, P.J., Nishioka, M., Andrews, K., Pollard, M., Brackney, L., Hines, C., Davis, D.B., and Menton, R. Evaluation and Application of Methods for Estimating Children's Exposure to Persistent Organic Pollutants in Multiple Media Volume I: Final Report.   1999. EPA/600/R-98/164a (NTIS PB99-134934).

2/23/1999

Contact: Nancy K. Wilson

Abstract:

Jan 1, 1999 - Dec 31, 1999

Knapp, K.T., Tejada, S.B., Cadle, S.H., Lawson, D.R., and Snow, R.F. Central Carolina vehicle particulate emission study (final report).   1999. EPA/600/R-99/090 (NTIS PB2001-100186).

Contact: Kenneth T. Knapp

Abstract: A study to characterize the exhaust emissions from a light-duty fleet of in-use vehicles representative of central North Carolina was conducted in 1999 during both a winter phase (February) and a summer phase (June - July). Summer temperatures averaged 78 F, while the winter temperatures averaged 63 F due to unseasonable warming. In the winter phase, 135 gasoline and 3 diesel vehicles were tested and in the summer phase, 120 gasoline and 5 diesel vehicles were tested. Ninety four percent of the vehicles were tested in as-received condition on the EPA transportable dynamometer using the IM240 driving cycle. The other six percent of the vehicles were tested on EPA's cold cell research chassis dynamometer in as-received condition. Regulated emission rates, PM10, aldehyde and ketone emissions rates were determined from all vehicles. In addition, PM2.5 and speciated hydrocarbon were determined from a subset of the vehicles. PUF/XAD samples were collected from a subset of the vehicles for analysis at Desert Research Institute for organic and elemental carbon, PAH's, nitro-PAHs, oxy-PAHs and the hopanes and steranes. Average PM10 emission rates for the gasoline-fueled vehicles were 4.6, 5.3, 17.3 and 19.6 mg/mi for the 1993-97, 1990-92, 1985-89, and pre-85 summer vehicles. The corresponding average PM10 emission rates for the winter phase, from a different vehicle fleet, were 7.8, 24.3, 26.0 and 69.4 mg/mi. The average PM10 and PM2.5 emission rates for the summer phase were 10.6 mg/mi (120 vehicles) and 7.2 mg/mi (16 vehicles) respectively with the corresponding median of 3.7 and 3.5 mg/mi. For the winter phase, the PM10 and PM2.5 average were 27.6 mg/mi (117 vehicles) and 32.2 mg/mi (45 vehicles) respectively and the corresponding median were 6.4 and 8.4 mg/mi. Linear regression of PM10 vs PM2.5 gave a slope of 0.92, intercept of -0.21 and an R2 of 0.99. Average total hydrocarbon emission rate was 0.63 g/mi for the summer phase and 1.1 g/mi for the winter phase. Average CO and NOx emission rates were 15.3 and 1.5 g/mi respectively for the summer and 14.3 and 2.1 g/mi respectively for the winter phase. Formaldehyde and acetaldehyde emission rates from 135 winter vehicles average 18.4 and 2.5 mg/mi respectively fro the winter and 9.2 and 1.7 mg/mi respectively from the 120 summer vehicles. Alkanes, alkenes, aromatics and oxygenates (alcohols/ethers) were 50, 11.7, 21.7 and 15.7% of the organic hydrocarbon emission in the winter phase and 41.5, 22.0, 28.7, and 1.6 % respectively in the summer phase. MTBE was the most abundant component of the oxygenate emissions.

Mukerjee, S., Shadwick, D.S., Dean, K.E., Carmichael, L.Y., Bowser, J.J., and Purdue, L.J.
Lower Rio Grande Valley transboundary air pollution project (TAPP) (main report).   1999.
EPA/600/R-99/047 (NTIS PB99-146938).

Contact: Shaibal Mukerjee

Abstract: The purpose of the Lower Rio Grande Valley Transboundary Air Pollution Project (TAPP) was
to obtain air quality data for a full year at three border monitoring sites to assess
anthropogenic and biogenic emission impacts and transboundary air pollution transport in the
Lower Rio Grande Valley of Texas. Performed by the U.S. Environmental Protection Agency
(U.S. EPA), in cooperation with the Texas Natural Resource Conservation Commission
(TNRCC) as part of the U.S.-Mexico Border XXI Program, the TAPP collected air quality,
precipitation, and meteorological data at three sites in and near Brownsville, Texas and close to
the U.S.Mexican border. Monitoring was performed on a near real-time basis for fine
paniculate matter (PM; 5); time-integrated continuous monitoring was performed for PM; 5 with
associated elements, coarse paniculate matter (PM^.io) with associated elements, paniculate
carbon, volatile organic compounds, polycyclic aromatic hydrocarbons, and pesticides.
Using these data, comparisons with Effects Screening Level (ESL) data were initially done.
ESLs are health/welfare-based screening levels established by the TNRCC and are not
ambient air standards. Comparisons with data from U.S. EPA and other environmental
exposure monitoring studies were also done. Chemical tracer analyses, wind sector analyses,
and rudimentary source apponionment analyses were also conducted.   The vast majority
of the approximately 2650 air pollutant samples acquired in this study were low or comparable
to ESLs .or environmental monitoring data from the literature. Overall, air quality in the
Brownsville area of the Valley was good. The few observations of pollutants exceeding these
levels appeared to be caused by uncenainties due to intrinsic variability of the data or
occasional local events (such as automotive traffic, local scrap fires, etc.), not by regional
phenomena or persistent transboundary plumes. With the exception of silver, methanol, and
acrolein, the rest of the seven air pollutants were above their ESLs only once. Of these three
persistent pollutants, sampling difficulties associated with acrolein and methanol means that
these values should be interpreted with caution.   Transboundary transpon of air pollution
plumes did not appear to cause noticeable deterioration of air quality on the U.S. side of the
Lower Rio Grande Valley border. The dominance of winds from the Gulf of Mexico was largely
responsible for the clean air conditions in the Brownsville air shed.   The information in this
document has been funded wholly or in part by the United States Environmental Protection
Agency under Contract 68-D2-0134 to QST Environmental, Inc., and contract 68-D5-0049 to
ManTech Environmental, Inc. It has been subjected to agency review and approved for
publication. Mention of trade names or commercial products does not constitute endorsement
or recommendation for use.

Mukerjee, S., Shadwick, D.S., Dean, K.E., Carmichael, L.Y., Bowser, J.J., and Purdue, L.J.
Assessing transboundary influences in the Lower Rio Grande Valley (community summary).
1999. EPA/600/S-99/004.

Contact: Shaibal Mukerjee

Abstract: The Lower Rio Grande Valley Transboundary Air Pollution Project (TAPP) was done to
determine if movement of air pollutants across the U.S.-Mexico border was occurring in the
Lower Rio Grande Valley (hereinafter called "the Valley") and, if so, the extent. The study was
conducted from March 1996 to March 1997 by the Environmental Protection Agency (EPA)
with the Texas Natural Resource Conservation Commission TNRCC). The study objectives
were to:a) Determine the air quality within the Valley and establish a baseline of air quality
data for future reference.b) Determine the movement of air pollutants across the
U.S.-Mexican border.c) Define what, if any, additional studies might be needed.
Monitoring was done at three fixed sites located very close to the U.S.-Mexican border.
Inhalable particulate matter (PM), chemical elements, volatile organic compounds (VOCs),
polycyclic aromatic hydrocarbons (PAHs), and pesticides were measured. Short-term fine
inhalable particle sampling was inducted to estimate potential episodes of emissions.
Meteorological measurements (weather data) were also collected.   Based on the daily and
near real-time monitoring conducted over the year, the study data suggest that the air quality
in the Brownsville area of the Valley was good. The reason for this was that the vast majority
of air pollutants were lower or comparable to published reference values and data collected in
other areas. During the study period, movement of air pollution plumes across the border did
not appear to cause noticeable deterioration of air quality. The dominance of sea breezes from
the Gulf of Mexico was largely responsible for the relatively clean air conditions observed. A
full assessment of possible cross-border movement of air pollution was limited since air
monitoring was restricted to the U.S. side of the border and emissions from air pollution
sources were not measured. Still, the TAPP establishes a baseline for future air monitoring
studies in the Valley.

Jan 1, 1999 - Dec 31, 1999

Mukerjee, S. Assessing transboundary influence in the Lower Rio Grande Valley (Q&A sheet). 1999. EPA/600/F-99/009.

Contact: Shaibal Mukerjee

Abstract:

5/25/1999

RESEARCH RPT

Williams, E.E., Clayton, C.A., Hardison, E.D., and Gutknecht, W.F. Laboratory evaluation of six new/modified portable x-ray fluorescence spectrometers for the measurement of lead in characterized paint films and research material boards (appendices).   1999. EPA/600/R-97/100b (NTIS PB99-162489).

7/22/1999

Contact: Sharon L. Harper

Abstract: A laboratory study was performed in 1994-1995 to identify and estimate the influence of key characteristics for evaluating the performance of portable X-ray fluorescence (XRF) spectrometers. Six new/modified spectrometers, including HNU SEFA-Pb, Metorex X-MET, Niton X-L, Radiation Monitoring Devices (RMD) LPA-1, TN Technologies Pb Analyzer, and Xsirius (now Advanced Detectors), were used to measure levels of lead in NIST SRM 2579 lead-in-paint films and in thicker Research Triangle Institute (RTI)-prepared lead-in-paint films placed on ten different substrates. These substrates ranged from plywood to carbon plate steel. As a result of this study, it was concluded that film thickness influences the precision of K-shell instruments more strongly than the precision of L-shell instruments. Also, L-shell instruments (except for Niton) have significant bias problems with the thicker paint films. Detection limits for K-shell instruments are mainly influenced by instrument precision whereas detection limits for L-shell instruments are mainly influenced by instrument bias. The 95% confidence range of the value of a single future measurement can be estimated at a given Pb concentration on a specific substrate using the data provided in this report. This 95% confidence range is calculated as the sum of the given or expected Pb concentration value and the value of the estimated bias plus/minus the halfwidth of the 95% confidence interval.

Williams, E.E., Clayton, C.A., Hardison, E.D., and Gutknecht, W.F. Laboratory evaluation of six new/modified portable x-ray fluorescence spectrometers for the measurement of lead in characterized paint films and research material boards (technical report).   1999. EPA/600/R-97/100a (NTIS PB99-162471).

7/22/1999

Contact: Sharon L. Harper

Abstract: A laboratory study was performed in 1994-1995 to identify and estimate the influence of key characteristics for evaluating the performance of portable X-ray fluorescence (XRF) spectrometers. Six new/modified spectrometers, including HNU SEFA-Pb, Metorex X-MET, Niton X-L, Radiation Monitoring Devices (RMD) LPA-1, TN Technologies Pb Analyzer, and Xsirius (now Advanced Detectors), were used to measure levels of lead in NIST SRM 2579 lead-in-paint films and in thicker Research Triangle Institute (RTI)-prepared lead-in-paint films placed on ten different substrates. These substrates ranged from plywood to carbon plate steel. As a result of this study, it was concluded that film thickness influences the precision of K-shell instruments more strongly than the precision of L-shell instruments. Also, L-shell instruments (except for Niton) have significant bias problems with the thicker paint films. Detection limits for K-shell instruments are mainly influenced by instrument precision whereas detection limits for L-shell instruments are mainly influenced by instrument bias. The 95% confidence range of the value of a single future measurement can be estimated at a given Pb concentration on a specific substrate using the data provided in this report. This 95% confidence range is calculated as the sum of the given or expected Pb concentration value and the value of the estimated bias plus/minus the halfwidth of the 95% confidence interval.

SYMPOS/CONF

Seila, R.L., Main, H.H., Arriaga, J.L., Martinez, G., and Ramadan, A.B. 1996 Paso del Norte ozone study VOC measurements. Proceedings of the 92nd Annual Meeting of the AWMA, St. Louis, MO, June 20-24, 1999.   1999. EPA/600/A-99/068 (NTIS PB99-171480).

6/20/1999   10/5/1999

Contact: Robert L. Seila

Abstract:

Jan 1, 1999 - Dec 31, 1999

Norris, G.A., Birch, M.E., Tolocka, M.P., Lewis, C.W., Solomon, P.A., and Homolya, J. Analysis of carbonaceous aerosols using the thermal optical transmittance and thermal optical reflectance methods. Proceedings of the 92nd Annual Meeting of the AWMA, St. Louis, MO, June 20-24, 1999.   1999. EPA/600/R-99/059 (NTIS PB99-171597).

6/20/1999   10/12/1999

Contact: Roy L. Bennett

Abstract: Carbonaceous particulate typically represents a large fraction of PM2.5 (20 - 40%). Two primary techniques presently used for the analysis of particulate carbon are Thermal Optical Transmission (TOT - NIOSH Method 5040) and Thermal Optical Reflectance (TOR). These two methods both quantify carbon by heating filters and volatilizing the carbon that is oxidized in a granular bed of Mn02, reduced to CH4 in a Ni methanator, and quantified as CR4 with a flame ionization detector. However, the methods use different techniques to correct for the formation of pyrolysis products and the temperature programs for defining organic and elemental carbon. The TOT and TOR measurement techniques are being compared using samples from the Chemical Speciation Monitor Evaluation Field Study. All of the samples will be measured with TOR and a subset of samples representing a range of mass concentrations will be measured with TOT. This comparison will provide insight into the effect of the measurement technique parameters on organic and elemental carbon concentrations.   This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade name or commercial products does not constitute endorsement or recommendation for use.

Mcclenny, W.A., Schmidt, S.M., and Kronmiller, K.G. "The Variation of the Relative Humidity of Air Released from Canisters after Ambient Sampling.".

1/1/1999

Contact: William A. Mcclenny

Abstract:

Arriaga, J.L., Martinez, G., Escalona, S., Figueroa, Y., Martinez, H., and Seila, R.L. Hydrocarbon and carbonyl ozone precursors in Mexico City ambient air. Presented at: Proceedings of the 1995 U.S. EPA/AWMA International Symposium on Measurement of Toxic and Related Air Pollutants, Pittsburgh, PA, May 16-18, 1995.   EPA/600/A-99/044 (NTIS PB99-151326).

6/3/1999

Contact: Robert L. Seila

Abstract: Urban air pollution is an environmental problem in many cities around the world that has serious immediate and long-term implications to the health of the population and to the physical environment. Mexico City, in particular, faces a severe air pollution problem. The city is located in a high mountain basin at subtropical latitude. The basin setting inhibits dispersions of pollution and contributes to frequent wintertime thermal inversions which further trap pollutants near the surface. The elevation and latitude combine to provide plentiful sunlight that, in comparison to more northern latitudes, is enhanced in UV radiation, which favors atmospheric photochemical reactivity to produce secondary pollutants such as ozone.
     Various studies of the concentration and composition of VOCs and carbonyl compounds in ambient air have been undertaken since 1992, at four sites in Mexico City. Total non-methane VOC concentrations have been usually high, ranging from 1.10 to 7.70 ppmC. The carbonyl species so far quantified are formaldehyde, acetaldehyde, acetone and propionaldehyde.   This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Jan 1, 1999 - Dec 31, 1999

Daughtrey, Jr., E.H., Oliver, K.D., Adams, J.R., Kronmiller, K.G., Lonneman, W.A., McClenny, W.A., and Colon, M. A stringent comparison of sampling and analysis methods for VOCs in ambient air. Presented at: Annual Air and Waste Management Meeting, St. Louis, MO, June 21-25, 1999.   EPA/600/A-99/075 (NTIS PB2000-100892).

6/21/1999

Contact: William A. Mcclenny

Abstract: A carefully designed study was conducted during the summer of 1998 to simultaneously collect samples of ambient air by canisters and compare the analysis results to direct sorbent preconcentration results taken at the time of sample collection. A total of 32 1-h sample sets were taken, each composed of a "real-time" sample analyzed by an autoGC/MS XonTech 930/Varian Saturn 2000 system, and SUMMA and Silco canisters. Hourly total non-methane organic carbon (TNMOC), ozone, and meterological measurements were also made. Each of the canisters was analyzed on the autoCG/MS system for a target list of 108 VOCs and on a manual cryosampling GC/FID system. Comparisons are made between the collection and analysis methods. Because of the low sample loading (150-250 ppbC TNMOC), these comparisons are a stringent test of sample collection and analysis capabilities.   This research was funded in part by the U.S. Environmental Protection Agency under Contract 68-D5-0049 to ManTech Environmental Technology, Inc. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.

Tolocka, M.P., Chen, F.L., Wiener, R.W., Peters, T.M., and Vanderpool, R.W. Design and performance of a low flow rate inlet. Presented at: Proceedings of 92nd Annual Meeting and Exhibition of the AWMA, St. Louis, MO, June 20-24, 1999.   EPA/600/A-02/064.

6/20/1999

Contact: Roy L. Bennett

Abstract: Several ambient air samplers that have been designated by the U. S. EPA as Federal Reference Methods (FRMs) for measuring particulate matter nominally less than 10 um (PM10) include the use of a particular inlet design that aspirates particulate matter from the atmosphere at 16.7 1pm. Several studies have indicated that, under some atmospheric conditions, design flaws in this PM10 inlet can cause it to fail to reject precipitation and small insects, allowing them to reach the sample filter. Therefore, the design of this inlet has been modified to minimize this possibility, and the modified inlet is currently used as part of the PM2.5 FRM to remove the bulk of large particles prior to PM2.5 size fractionation. The purpose of this study is to compare the performance of the modified and original inlets, using the EPA Aerosol Test Facility (ATF) wind tunnel, to determine if the modified inlet could be used with PM10 FRM samplers without altering their PM10 performance relative to the FRM regulatory requirements. The test follows the wind tunnel Standard Operation Procedures as outlined in Subpart D of Title 40, Part 53 of the U. S. Code of Federal Regulations. The procedure for this investigation includes the simultaneous sampling of monodisperse aerosol through both the original and modified inlets as well as an isokinetic sampler. The isokinetic sampler provides a basis for determining the sampling efficiency of each inlet. The sampling protocol is repeated for liquid particles ranging in aerodynamic diameter from 3 to 25 micrometers. Solid particles are used to check for particle bounce. A sampling efficiency curve has been developed for 3 to 25 micrometer particles for wind speeds of 2, 8, and 24 km/hr and the 50 % cut-point determined. The data presented from this comparison of the performance of the modified and original inlets give a quantitative evaluation on the efficacy of the modified inlet for PM10 samplers.   This paper has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review policies and approved for presentation and publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for us.

Lewis, R.G., and Nishioka, M. Residential indoor exposures of children to pesticides following lawn applications. Presented at: Indoor Air '99, Edinburgh, Scotland, August 9-13, 1999. EPA/600/A-99/069 (NTIS PB99-175432).

8/9/1999

Contact: Robert G. Lewis

Abstract: Methods have been developed to estimate children's residential exposures to pesticide residues and applied in a small field study of indoor exposures resulting from the intrusion of lawn-applied herbicide into the home. Sampling methods included size-selective indoor air sampling; wipe sampling of floors, sills, tables; the polyurethane foam (PUF) roller for dislodgeable carpet surface residues; and the HVS3 vacuum sampler for floor dust. Personal exposure samples included hand wipes and morning void urine samples.   Pesticide spray drift was found to result in only a relatively minor increase in indoor pesticide levels. Post-application air intrusion from closed house ventilation and the opening and closing of doors and windows increased indoor background levels 6-fold, while track-in by high activity children and pets, and wearing shoes indoors, increased indoor levels by 37-fold. Indoor 2,4-D levels were found to increase continually over a one-week period, with the increase in indoor air levels corresponding to the increased floor dust levels, suggesting resuspension of house dust by human activity. Similar estimates of non-dietary exposure are obtained from models based on 100 mg dust ingestion and surface contact simulated by the PUF roller.   This work has been reviewed in accordance with the U.S. Environmental Protection Agency's peer and administrative review process and approved for presentation and publication. Mention of tradenames or commercial products does not constitute endorsement or recommendation for use.

Klouda, G.A., Lewis, C.W., Rasmussen, R.A., Stiles, D.C., Ellenson, W.D., and Marolf, J.L. Isotopic (14C) and chemical composition of atmospheric volatile organic compound fractions - precursors to ozone formation. Presented at: Proceedings of the Third International Conference on Isotopes, Vancouver, Canada, September 6-10, 1999.   EPA/600/A-02/058.

9/6/1999

Contact: Charles W. Lewis

Abstract: Atmospheric volatile organic compounds (VOCs) are an important factor in the production of ozone near ground level [3]. Many hydrocarbons originate from auto exhaust. However, a number of VOCs, e.g., isoprene, are known to be natural in origin. To develop reliable models for understanding how ozone levels might be controlled, it has been recognized that a key variable is the fractional amount of fossil vs. non-fossil (biogenic, uncontrollable) VOCs [1]. These two source categories are uniquely discriminated from each other based on the 14C abundance of VOC fractions. Combining isotopic measurements with chemical information will yield greater confidence in source estimates. Over the last 8 years, NIST, OGI and the U.S. EPA have explored sampling methods and analytical procedures to collect enough carbon from atmospheric non-methane VOC fractions to measure the 14C composition [4,9]. In doing so, this work also provided an opportunity to enhance the sensitivity of GC-FID and GC-MS for chemical identification and quantification. This paper will briefly describe the methods studied and present preliminary 14C and chemical results from Azusa, CA, Houston, TX, and Nashville, TN, USA.

Jan 1, 1999 - Dec 31, 1999

Mukerjee, S., Shadwick, D.S., Dean, K.E., and Carmichael, L.Y. Assessing transboundary influences in the Lower Rio Grande Valley. Presented at: the 92nd Annual Meeting of the AWMA, St. Louis, MO, June 20-24, 1999.   EPA/600/A-02/063.

Contact: Shaibal Mukerjee

Abstract: The Lower Rio Grande Valley Transboundary Air Pollution Project (TAPP) was a U.S.-Mexico Border XXI Program project to assess transboundary air pollution in and near Brownsville, Texas. The study used a three-site air monitoring network very close to the border to capture the direct impact of local sources and transboundary transport. Ambient data included paniculate mass and elemental composition, VOCs, PAHs, pesticides, and meteorology. Also, near real-time, PM^5 mass measurements captured potential pollutant plume events occurring over 1-h periods. Data collected were compared to screening levels and other monitoring data to assess general air pollution impacts on nearby border communities. Wind sector analyses, chemical tracer analyses, principal component analyses, and other techniques were used to assess the extent of transboundary transport of air pollutants and identify possible transboundary air pollution sources.   Overall, ambient levels were comparable to or lower than other urban and rural areas in Texas and elsewhere. Movement of air pollution across the border did not appear to cause noticeable deterioration of air quality on the U.S. side of the Lower Rio Grande Valley. Dominant southeasterly winds from the Gulf of Mexico were largely responsible for the clean air conditions in the Brownsville airshed. Few observations of pollutants exceeded effects screening levels, almost all being VOCs; these appeared to be due to local events and immediate influences, not regional phenomena or persistent transboundary plumes.   The information in this document has been funded wholly or in part by the United States Environmental Protection Agency under Contracts 68-D2-0134 to QST Environmental, Inc. and 68-D5-0049 to ManTech Environmental, Inc. It has been subjected to agency review and approved for publication. Mention of trade names or commercial products does not constitute endorsement or recommendation for use.